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JAMES P. PORTER, EDITOR
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WITH A BOARD OF CO-OPERATING EDITORS

TABLE OF CONTENTS

THOMAS H. HOWELLS and ALLRAN A. JOHNSON. A Study of Metre-Sense in Poetry 539

HENRY F. ADAMS. Measurement in Psychology 545

N. FRANKLIN STUMPF. Listening versus Reading Method in the True-False Examination 555

ALFRED G. DIETZ. The Relations of Several Factors to Factual Memory 563

KATE HEVNER. A Study of Tests for Appreciation of Music 575

HARRIET BABCOCK. Psychological Testing in Psychopathology 584

A. S. EDWARDS. The Death Sentence and Psychological Examinations 590

HARRY DEXTER KITSON. Report of the 7th International Conference on Psychotechnique 593

Notes and News 597

Book Reviews 600

New Books and Pamphlets Received 605

Index 607

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CONTENTS

HENRY F. ADAMS: The Theory of Two Factors: An Alternative Explanation: Part I: General Factor, "G" 16
Part II: Specific Factors 358
HENRY F. ADAMS: Measurement in Psychology 545
HARRIET BABCOCK: Psychological Testing in Psychopathology 584
E. M. BAILOR: See Meltzer and Bailor.
ROBERT J. BALL: The General Emotionality of the Prisoner 436
KEY LEE BARKLEY: A New Method for Determining the Relative Efficiencies of Advertisements in Magazines 390
MAXINE BAUMGARTNER: The Correlation of Direct Suggestibility with Certain Character Traits 1
M. EUSTACE BROOM, JOSEPHINE DOUGLAS, and MARION RUDD: On the Validity of Silent Reading Tests 35
JOHN L. BROSE: See Wallace and Brose.
ROBERT A. BROTEMARKLE: Determining the Point of Emphasis in College-Adult Level Testing 462
HERBERT A. CARROLL: The Effect of Intelligence upon Phonetic Generalization 168
HULSEY CASON: General Curves and Conditions of Feeling 126
NANCY CASTLEMAN, MARGARET GROVER and HERBERT MOORE: An Aptitude Test for High School Teachers 208
J. A. CEDERSTROM: Repeaters at the College Level 411
HARRY W. CRANE: The Necessity of Psychometric Tests in the Study of Maladjustments 304
ALFRED J. DIETZ: Relation of Several Factors to Factual Memory 563
JOSEPHINE DOUGLAS: See Broom, Douglas and Rudd.
JUNE E. DOWNEY: Inverse Trends in the Pressey X-O Test and the Downey Will-Temperament Test 273
A. S. EDWARDS: The Death Sentence and Psychological Examinations 590
G. H. ESTABROOKS: Personality Training and the Changing Emphasis in the Liberal Arts College 96
PAUL R. FARNSWORTH and ISSEI MISUMI: Notes on the Meier-Seashore Art Judgment Test 418
K. C. GARRISON and SUE CRAFT HOWELL: The Relationship between Character Trait Ratings and Certain Mental Abilities 378
EDWARD B. GREENE: Effectiveness of Various Rates of Silent Reading of College Students 214

C. H. GRIFFITTS: A Study of Some "Motor Ability" Tests 109
MARGARET GROVER: See Castleman, Grover and Moore.
J. P. GUILFORD and RUTH B. GUILFORD: A Prognostic Test for Students in Design 335
RUTH B. GUILFORD: See Guilford and Guilford.
MARION HAMMOND: A Note Concerning Rhythm Tests in Poetry and in Music 90
B. F. HAUGHT: The Language Difficulty of Spanish-American Children 92
KATE HEVNER: A Study of Tests for Appreciation of Music 575
H. L. HOLLINGWORTH: Diurnal Variations in Suggestibility 431
GRACE HOLMES: The Relative Legibility of Black Print and White Print 248
HOWARD T. HOVDE: Consumer Preferences for Small Glass Containers 346
SUE CRAFT HOWELL: See Garrison and Howell.
THOMAS H. HOWELLS and ALLEAN A. JOHNSON: A Study of Metre-Sense in Poetry 539
ALLEAN A. JOHNSON: See Howells and Johnson.
HARRY D. KITSON: Report of the 7th International Conference on Psychotechnique 593
ALICE M. LEAHY: Punching Psychological and Sociological Data on Hollerith Cards 199
EDWARD A. LINCOLN: A Reliability of the Lincoln Hollow Square Form Board, and a Comparison of Hollow Square Scores with Stanford Binet Mental Ages 79
C. M. LOUTTIT: Test Performance of a Selective Group of Part-Hawaiians 43
H. MELTZER and E. M. BAILOR: Extent and Nature of Students' Knowledge of Psychology Before and After the First Course 279
ISSEI MISUMI: See Farnsworth and Misumi.
HERBERT MOORE: See Castleman, Grover and Moore.
BEULAH M. MORRISON: See Walton and Morrison.
ELMA OLSON: A Study of the Emotions in Psychopathic Personalities Based on the Pressey X-O Tests 182
DONALD G. PATERSON and MILES A. TINKER: Studies of Typographical Factors Influencing Speed of Reading: Part VI. Black Type Versus White Type 241
DONALD G. PATERSON: See Tinker and Paterson.
RUDOLF PINTNER: Intelligence and Month of Birth 149
H. H. REMMERS: Typical Points of View on Learning Presented to Beginning Students of Education 155

HERBERT W. ROGERS: Motion Study Tables for Clerical Operators 82
MARION RUDD: See Broom, Douglas and Rudd.
GEORGENE H. SEWARD: Students' Reactions to a First Course in Psychology 512
ERNEST B. SKAGGS: A Study of "Warming-up" in the Case of a Task of More Complicated Perceptual-Motor Coordination 499
G. R. SMITH: Mental Growth—A Criticism 319
MAPHEUS SMITH: Concerning the Magnitude of the Behavior Sample for the Study of Behavior Traits in Children 480
ROSALIND L. STREEP: A Comparison of White and Negro Children in Rhythm and Consonance 53
N. F. STUMPF: Listening Versus Reading Method in the True-False Examination 555
MILES A. TINKER and DONALD G. PATERSON: Studies of Typographical Factors Influencing Speed of Reading: Part V: Simultaneous Variation of Type Size and Line Length 72
Part VII: Variations in Color of Print and Background 471
MILES A. TINKER: See Paterson and Tinker.
AUSTIN H. TURNEY: A Study of the Reliability of Judgments in Relation to the Certainty of the Judgments, to the Interval between Judgments, and to the Number of Subjects Judged 259
VERNA KIMBERLY WALLACE and JOHN L. BROSE: Who Knows About Aviation? 39
WILLIAM E. WALTON and BEULAH M. MORRISON: A Preliminary Study of the Affective Values of Colored Lights 294
R. H. WATERS: A Study of Customer Attitude 252
C O. WEBER: The Aesthetics of Rectangles and Theories of Affection 310
PAUL THOMAS YOUNG: Sex Differences in Handwriting 486

A STUDY OF METRE-SENSE IN POETRY

THOMAS H. HOWELLS AND ALLEAN A. JOHNSON
University of Colorado

INTRODUCTION

The traditional program of instruction in poetics seems to take it for granted that every child is able to sense metre in poetry. In view of the very wide and increasing range of human traits in regard to which individual differences have been discovered and measured, this assumption may appear somewhat in question.

Poetical rhythm seems to have much in common with rhythm in dancing and in music. Originally they were mutually cooperative in the expression of primitive emotion. Each supplemented the other and the characteristics of each were necessarily molded and modified to fit the style of the others. The cadence of the music was largely the outgrowth of the rhythm of the dance, which also determined the metre of the phrases chanted during the dance.

The Seashore measures of musical talent seem to have established the fact of individual differences as regards the musical senses. Their increasing use seems to demonstrate their practical value in the discovery of fundamental auditory handicaps in music. These tests suggest the possibility of measures of the basic poetical talents, and in addition perhaps the diagnosis of aesthetic perception in dancing.[1]

THE PROBLEM

The purpose of the research which is here reported was to develop a measure of ability to discriminate between types

[1] A study of perception of rhythm in dancing is under way at the University of Colorado. The criteria in this case are the judgments of motion pictures of dancers.

THE JOURNAL OF APPLIED PSYCHOLOGY, VOL. XV, NO. 6.

of metre in poetry and in-so-far as possible to discover the components and concomitants of this ability. A coordinate objective was the construction and standardization of a test that would have value in educational and vocational guidance.

THE PROCEDURE

The specific task set for the test subject was that of observing a sample line of poetry and then identifying, out of a list of four subsequent lines, the one that corresponded most closely with the rhythm or metre of the sample. For the sake of simplicity it was decided to include in the test only lines which were representative of the four principal varieties of metre, namely, iambic, trochaic, dactyl, and anapest. Nine hundred and five lines of poetry were obtained from nine of the well-known texts dealing with poetical literature. Each of these lines had been scanned and designated by the authors of these texts as examples of one of the four varieties of metre mentioned. These lines were independently scanned by a professor of English Literature[2] at the University of Colorado. Those specimens, in regard to which there was a difference of opinion or which the critic thought to be either indefinite in nature or subject to variation in the accent of words, were eliminated.

The first draft of the test included some six hundred and twenty-five lines which were divided into one hundred and twenty-five units, each consisting of a sample line followed by four optional lines for identification.

The instructions included at the beginning of the test were as follows:

> Each of the lines of poetry in this test has a certain "swing," rhythmic beat, or metre. In each problem the first line, marked S, is a sample line. Your task is to decide which one of the four lines that follow has the same metre as the sample, and to mark a cross in the circle, O, in front of it.
>
> Please note that the lines having the same meter are not necessarily of the same length, or made up of the same number

[2] Dr. P. R. Clugston.

of words. The only requirement is that they have the same *beat* or *rhythm* in reading. One and only one of the four lines has the same metre as the sample.

For instance, in example 1, below, line 2 has the same metre as the sample, and therefore has a cross marked in the O in front of it.

Example 1

S. Upon whose bosom snow has lain.
○ 1. The beggar's taxed for a corner to die in
⊗ 2. As from a cup I drank it up
○ 3. Sweet to me thy drowsy tone
○ 4. Half a league, half a league

Another example was given, after which came the body of the test, which included some 125 items which were similar to the example given above.

PRELIMINARY TRIAL AND REVISION

The test as described was tried out on twenty-one college students. In administering the test no time limits were set, although the subjects were told to proceed as rapidly as possible and time records were kept for each individual.

On the basis of the results obtained from this preliminary trial and of the personal reports from the subjects, thirty-nine additional units were eliminated. The test was now reconstructed from the remaining eighty-six units. A number of units of both the very easy and the very difficult sort were included in order to extend the range of the test so as to adapt it for use with younger and also with more advanced subjects.

STANDARDIZATION AND NORMS

There was no change in administration of the final form except that the subjects were advised that there were eighty-six problems in the test and that the time limit was thirty minutes. In introducing the test the supervisor asked the subjects to read the instructions silently while she read them

aloud and emphasized the metre in the samples by beating it out.

The college group was made up largely of juniors in the school of arts and sciences. The median school grade was 14.56, and the mean chronological age was 21.81 years. There were 36 men and 54 women in the group. The median score for the college group was 37. The standard deviation of the scores was 16.74, and the probable error of a score was 3.4. The coefficient of correlation of odd and even items was .83, indicating a coefficient of reliability[3] of .91 for the whole test as applied to the college subjects.

The subjects making up the high-school group were all in the eleventh grade. The median chronological age was 16.6 years. The median score for the high-school group was 24. The standard deviation of the score was 9.8, and the probable error of a score was 2.3.

Norms were calculated independently for the high-school and college groups. The raw scores were converted into percentile rank scores and a percentile curve was constructed for each of the distributions. These curves were smoothed and a normal percentile score was derived for each decile of both distributions.

VALIDITY

It would appear that the validity of the test is more or less self-evident, since it is made up of actual samples of the subject-matter in which the ability expresses itself. As a means of obtaining objective evidence in regard to validity the high-school instructors in literature were asked to rate those of the high-school subjects whose literary ability they had opportunity to observe with particular reference to their ability to sense metre in poetry. The rating was on a point scale with specified subjective norms. Fifty-four pupils were rated. The coefficient of correlation between the ratings and the scores on the metre-sense test was .56.

[3] According to the Brown-Spearman formula.

THE CONCOMITANTS

The development of a measure of any particular ability always raises the problem as to what part or parcel it has in common with other constituents of personality, such as the heirarchy of traits that is measured by the typical intelligence test. The scores made on the Otis group test were available for seventy-two of the college subjects. The coefficient of correlation between the intelligence scores and the scores on the metre-sense test was found to be .31.

The indications in regard to the influence of maturation and training are not very conclusive. The most significant fact is the great difference between the norms of the high-school group and the college group. The median score for the former is 24, as compared with 37 for the latter. The increase of 13 which apparently takes place during four academic years is very significant. This difference might be ascribed to difference in academic training. It should be recognized in this regard, however, that the groups are comparable only in a very general way. The high-school pupils are largely the product of a single school and community environment. The college group has had a great deal of training, specific and general, but the exact nature of it is not known. Also a great deal of academic elimination has taken place.

Courses in which the scansion of poetry was a fundamental part had been taken by twenty-four of the eighty high-school students. The median score of 26 for this group is suggestive of some slight increase in ability as a result of training, but the difference is not statistically significant. The background of literary training for the college subjects was so indefinite and varied that it was impossible to make any classification.

Sex did not seem to have much influence in the growth of metre sense. The median score for the thirty-six males in the college group was 36, and for the fifty-four females the median score was 38. The difference is not statistically significant.

Because of the apparent similarity in the functions involved in discriminating between types of metre in poetry and in

distinguishing differences in samples of musical rhythm as in the Seashore test, it was considered worth-while to try to determine the relationship between the two tests. The Seashore rhythm-sense test was given to fifty-six of the college subjects and the coefficient of correlation of these scores with the scores on the metre-sense test was found to be .19. Apparently the functions involved are not so much the same as might be expected.

SUMMARY

By way of summary it appears that (1) a fairly accurate measure of ability to discriminate between types of metre in poetry has been developed; (2) separate norms have been obtained for college juniors and high-school juniors; (3) metre-sense seems to have some positive relationship to intelligence; (4) metre-sense increases with academic age; (5) metre-sense does not seem to be much influenced by specific training, rhythmic sense in music, or sex; (6) there is some agreement between test scores and teacher's estimates of metre-sense.

MEASUREMENT IN PSYCHOLOGY

HENRY F. ADAMS

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The physical sciences have produced three fundamental scales of measurement. Concerning time and distance there is general agreement. Whether mass or force should be taken as the third is apparently a matter of indifference, for given time and distance, mass can be determined if force is known, and force determined if mass is known. Consequently, the selection of the third candidate will be determined by the exigencies of presentation which in this case lead us to select time, space, and force.

When these three scales have been determined and agreed upon by those who use them, additional properties may be defined and measured numerically in terms of one or more of these three. Such measurements when interpreted result both in an increased bulk of knowledge and in an increased clarity of what is known. Higher precision of measurement makes for finer discriminations and these in turn provide more accurate terms with which to think. Because they have measuring instruments of high precision the physical scientists have learned much concerning physical phenomena and their interrelations, knowledge which has been used to the benefit of mankind.

Contrast with this the present condition of experimental psychology. Experimental psychology was born some eighty odd years ago. As far as lineage can be traced it was sired by Weber's law, a statement of the relation between intensity of stimulus and intensity of sensation, and expressed in terms which have some claim to being considered quantitative. In the ensuing eighty years experimental psychology has added

not a single quantitative law to the original one. The reason is not far to seek. In the physical sense experimental psychologists do not and cannot measure except in the one scale of time.

Mental phenomena, if they be considered a proper subject-matter of psychology, exist in time, but neither occupy space nor exert force. One's mental phenomena are known only to himself and are inferred by others from bodily movements. Bodily movements being physical can be measured in terms of the fundamental and derived physical scales. But this is not measuring mental phenomena, and is, at best, a subterfuge, a begging of the question.

Mental phenomena, however, possess the attributes of intensity, duration, quality, and in some cases extensity. When we compare the mental with the physical phenomena we find a certain kinship between duration and time, between extensity and distance, between quality and quality, and between intensity and force. Mental phenomena persist briefly in time, they differ in intensity, they differ in quality, but apparently they do not differ in extensity as such only in their meaning of extensity, as this meaning has an objective reference. As referred to the interpretation of objects, however, all four of the attributes are meaningful. In view of the peculiar relation of extensity to the other attributes there has been a tendency on the part of some to substitute number for extensity or distance. The outcome has been none too fortunate as will be shown in the sequel. From the practical point of view it should make no difference whether we are dealing with pure attributes or their meanings.

At any rate experimental psychologists find themselves at the present time unable to measure their conscious or mental phenomena in a numerical fashion on any scale except that of time. Hence it must be admitted that psychology is not a quantitative science and will never be a quantitative science until measuring scales comparable to the physical scales of distance and force, or mass, are developed. Until that time

psychological fact will remain subjective, a matter of taste or opinion. It must remain in this stage of development until additional scales are devised which will permit of numerical measurement in the strict meaning of the word. Initially the scales will be crude and inexact but time should lead towards greater perfection and precision. Already important beginnings have been made by Courtis, Thurstone and Guilford among others.

A promising method of approach by way of the attributes of sensation is available. Whether or not it will yield useful techniques awaits the appearance of such scales. All efforts directed towards the development of scales must rest upon a sound theory of measurement and must take advantage of all the warnings sounded by experience. In the paragraphs that follow are pertinent quotations from three men who may be considered to be authorities.

"Whenever we measure, . . . we compare a given magnitude with some conventional unit of the same kind, and determine how many times the unit is contained in the magnitude. . . . All measurement thus implies three given terms: the two limiting points of the magnitude to be measured (beginning and end, top and bottom, extreme right and extreme left, zero and maximum) and a third point lying at unit distance from one or other limiting point."[1]

To this description, Kuelpe adds certain details, as follows:

"There are two possibilities of measurement in natural science: the direct procedure, which formulates a process in terms of a conventional unit of its own kind; and the indirect, which gives it a quantitative expression by noting its functional relation to some directly measurable process. . . . It may be remarked here that spatial magnitudes alone admit of direct measurement; and that the fundamental condition of exact measurement in natural science is, therefore, the establishment of unequivocal functional relations between spatial magnitudes and all other natural phenomena."[2]

[1] Titchener, Textbook of Psychology, pages 207–208.

[2] Kuelpe, Outlines of Psychology, pages 45–46.

Bertrand Russell rounds out the picture with these statements:

"The result of applying number to this quantity I call magnitude, and the operation of applying number I call numerical measurement." "I shall generally use measure to denote only comparison as to the more or less." "Thus the numerical measurement of extensive qualities consists of two steps: in the first, which alone is quantitative, we assure ourselves that we have a collection of *equal* quantities; in the second, we count these equal quantities as we might count anything else."[3]

Russell further makes a distinction between extensive and intensive quantity, as follows:

"We have, at the outset, a fundamental division of quantities into two kinds, extensive and intensive, according as a change of quantity is, or is not, a quantity of the same kind as the quantity changed. . . . A quantity is extensive when a change in it is a change of the same kind. . . . But with intensive quantities . . . these differences of quantity are not themselves quantities. . . . With this, it will be seen, we have lost the last possibility of numerical treatment: extensive quantities could be divided into parts, which could be counted, but intensive quantities cannot be numerically measured in any way. . . . Since intensive quantities are not divisible or numerically measurable, the quantitative changes in qualities which have intensive quantity cannot be submitted to any objective test, but must be judged by immediate comparison of sensations. Where changes of sensation are found empirically to be correlated with changes of some extensive quantity, we may agree conventionally, as we do with the thermometer, to take the magnitude of this correlated extensive quantity as measuring the magnitude of our intensive quantity. But such an agreement can never be more than a convention, and the apparent objectivity which results is fictitious and merely convenient. All that we really have to go upon is the immediate apprehension of a change, as revealed by subjective comparison. This explains why intensive quantity, if it is a category at all, is mainly a psychological category."[4]

[3] B. Russell, Mind, N. S., Vol. 6, pages 329 and 330.

[4] B. Russell, Mind, N. S., Vol. 6, pages 332–334.

From the quotations given above, the following considerations emerge:

1. Measurement may be made in terms of more or less of a single attribute. It depends upon comparison and discrimination.
2. Numerical measurement consists of counting units of amount and hence depends upon units.
3. The units are ordinarily conventional rather than natural. The natural units are number and revolution.
4. The units of amount are expressible only on a linear scale.
5. The scale must have an upper and a lower limit.
6. When experiences of more or less are correlated with extensive changes, a conventional scale may result, which will permit of numerical expression.

Two distinct problems now appear. The first is the answer to the question, Is numerical measurement desirable with the phenomena of psychology? The second is the answer to a different question, Is the numerical measurement of psychological phenomena possible?

The answer to the first question is presumably an affirmative. Concerning the answer to the second, opinion will not be so unanimous. Yet if the foregoing analysis of measurement is accurate and sufficient, a promising point of attack is suggested. For it may happen that experiences of more or less may be correlated with extensive changes of linear magnitudes. If this proves to be the case, a conventional scale composed of equal or equivalent units will result. By applying the scale we should be able to measure numerically and quantitatively.

The immediate approach is by way of the attributes of sensation. Quality, intensity, and duration are characteristics of all cognitive experiences, and extensity is of some. Any one of the four can be compared with itself in terms of more or less. To this extent psychologists can measure, and have measured for generations. Such measurement is not, however, quantitative. The pertinent problem is whether any charac-

teristic of the measurements by more or less can be transformed into units of amount which can be expressed on a linear scale. This question is similar to the one raised by Weber's law but the emphasis is very different. In its original form Weber's law has to do with the relation of intensity of stimulus to intensity of resulting sensation. Intensity of sensation in turn was made a function of the percentage of errors. The last step has always been the unproved assumption. Wisdom, therefore, recommends its avoidance.

By a slight modification of the psychophysical techniques used in the determination of Weber's law, the problem outlined above may be approached. The idea of sensation intensity will be absolutely disregarded. In fact the approach will be behavioristic, not that the writer holds any brief for behaviorism but because the method seems to be the most effective in the situation.

The program is as follows. Compare two or more linear magnitudes, note the errors resulting from the different comparisons, and plot one against the other. If the resulting series of points forms a smooth curve it will be possible to express differences in terms of errors, or errors in terms of differences. The meanings will be identical. The unit distance may be defined as that distance which is reacted to correctly in 75 per cent of the cases, or any other percentage preferred to 75. The important feature is to have general agreement as to the percentage of error which shall define the unit distance. If the unit distance be given an arbitrary value of 1.00, other differences in extent may be expressed as multiples and submultiples of the unit distance. Thus the scale becomes quantitative since it is made up of a baseline indicating the extent of the one attribute, distance, and the units on the baseline are equal. The baseline also extends from maximum to minimum, that is, from differences so great as to give 0 per cent of errors to those so small as to give 50 per cent of errors. Assuming the relational curve to be smooth the graph enables us to measure percentage differences in a numerical

way on a scale extending from minimum to maximum and composed of equal units. Such a scale may be termed a linear scale or a scale of distance. A scale of intensity could be determined in the same way.

At this point we should face one problem which is fundamental to the whole discussion. Should the units suggested above be equal in the physical sense, or in the psychological sense? If they are equal in the physical sense, errors would increase rapidly relative to distance as the differential threshold was approached or passed in the downward direction. Such unequal rate of acceleration might enable us, if one absolute magnitude were known, to know the other. But this could happen only over a limited range of differences for the two limiting points, chance or certainty, would soon be reached. It would be necessary then in every case to know one value absolutely to obtain the others. On the other hand if just noticeable differences are assumed to be equal the same difficulty exists. As a matter of practical fact it apparently makes little difference which method is employed for both will yield the same end result.

Of much more importance is the experimental technique. We are not referring here to such things as the space error, the time error, and others brought to light by the psychophysical techniques but to the control of the variables. Presumably all variables should be kept constant or their effect eliminated by some of the accepted techniques except the one under investigation. For if two variables exist simultaneously there is always the chance that they cannot be entirely separated by attention. If this is the case then variable A should exert an influence upon the discrimination of variable B, and *vice versa*. Such influence might be positive in that it increased the accuracy of discrimination, negative, in that it decreased the accuracy, or indifferent, in that it had no effect upon the accuracy. It may be that variables which have a high positive correlation should increase the accuracy of discrimination, while a high negative correlation would decrease the accuracy.

This whole field of the effect of simultaneous variables needs investigation. At present, little is known about the matter. But one thing is sure—there is no excuse for applying single variable facts to multi-variable situations until something is known about their mutual interaction.

The method or methods to be employed in the search for a scale of numerical measurement is also a matter of considerable import. The traditional psychophysical methods are undoubtedly the most accurate, but they scarcely lend themselves without considerable modification to many of the practical problems which we might wish to investigate. We must either use the same technique throughout or be able to express results obtained by one method as the equivalents of those obtained by another, as we change inches to centimeters.

A makeshift much used in recent times has been to substitute the concept of number for the concept of distance. This is the ordinary practice with mental test scores. The procedure is roughly like that involved in setting up a number of irregularly spaced stakes, and measuring one's ability in running by counting the number of stakes passed in three and a half minutes. There could be no serious theoretical objection if the stakes were evenly spaced; but no one knows for certain whether or not they are, though the presumption is that they are not. Consequently, such a method is not quantitative. It can describe only in terms of more or less and cannot tell how much more or less in terms of any equal units. Mental tests can rank individuals in order of merit but they cannot measure. The IQ itself is literally without quantitative significance. If, as is held by many, test items increase progressively in difficulty from first to last, comparisons between IQ's are misleading, exaggerating stupidity, and penalizing brilliance.

Psychological literature is replete with instances of such uncritical subterfuges. The very popular scale of values method, the class interval method, the graphic rating scale, and others of like ilk are all based upon fallacious premises.

Yet they all indicate by their very being the need which is felt for quantitative scales in psychology. A better example of rationalization is hard to find.

For those who use such scales apparently believe that all individuals included in the investigation, and the selection is usually random, have a private and exact scale of the attribute being investigated. If the methods are to be useful in any quantitative way, the scales of all subjects must be identical as to range and units. That this is not the case is shown by any bit of experimental data in which such scales have been used. For each individual seems to have his own private standard, his own private unit which, save by chance, does not agree with the private standard or unit of anyone else. The results of such alleged measurements, unless we can transmute each unit into the others, can be only judgments of more or less. In other words, they can provide a rank order. But the much simpler rank difference method can do the same.

The greatest drawback of the methods just mentioned is that the experimenter is tempted, often past endurance, to give the one rated an absolute value in a certain trait, such as honesty. He does this in spite of the fact that he knows nothing about the distribution of honesty, the approximate length of the base-line save in terms of sigma, the shape of the curve, or any other single feature about it save that individuals apparently differ one from another. From the point of view of this paper such methods violate the fundamental principle that measuring involves a comparison between two things which will result in a judgment of more or less. In the absence of a standard scale no individual can be even approximately measured in any of the more subjective characteristics. Judgments based upon discrimination between at least two samples and expressed in terms of more or less of the discriminated attribute are the only safe approach to psychological measurement. Possibly in time to come more objective tests will be developed which will enable us to evaluate the single individual in terms of a standard score. But such tests will not have a high

validity unless they show a high correlation with results obtained from judgments of more or less. The more quantitative we can make the judgments of more and less, the more effective will the tests be.

In selecting a method then we must provide at least two samples differing from each other, if possible, only in the one feature to be compared. We must measure one in terms of the other or others on a basis of more or less.

Two methods at least satisfy these requirements and are at the same time flexible enough to use both in the laboratory and outside it. These are: (1) The method of paired comparison; and (2), the method of rank differences. Each method has certain advantages over the other, but in the long run their virtues seem to be about equally balanced. Experimental comparisons have been made between them but the workers have unfortunately overlooked the need of repeating the experiment by each method in turn, so that the difference between the two could be compared with the average difference of each from itself. At any rate, rank difference material can always be transformed into paired comparison, and paired comparison into rank difference. In view of our problem, both must be studied and analyzed. We have chosen for purposes of convenience to begin with the rank difference method.

LISTENING *VERSUS* READING METHOD IN THE TRUE–FALSE EXAMINATION

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The scientific mind meets popular prejudice whenever this problem is raised. College students are quite *positive* that the mimeographed true-false test is "fairer" than the oral test. By this they mean that they can produce a higher score by the reading method than by the listening method. It is the purpose of this article to present reasons offered by college students in favor of each method and also to present data upon this problem which has attracted considerable attention. Mention may be made concerning a few recent articles which demonstrate interest in this subject.

It can hardly be contradicted that more specific training should be given listening ability in our schools. It may be safely assumed that every teacher at one time or another who checks-up on desirable educational changes in her pupils, which she intends to bring about by the telling method, takes the attitude, "now that detail has been thoroughly explained, but what did the students hear." Listening ability may never receive proper emphasis in the schools until we place more of a premium upon it in our examinations. Tests we all know set up many useful immediate objectives which can scarcely be set up in any other way. The necessity of placing more stress on this ability is revealed by Rankin.[1] His data show frequency of use with respect to several types of communicative activity. His study reveals that 42 per cent of the "waking time" is spent in listening, 32 per cent in talking, 15 per

[1] Rankin, Paul T. "Listening Ability." The Ohio State University Bulletin. Volume 34: 172–183. September 15, 1929.

cent in reading and 11 per cent in writing. We note that listening occupies almost three times as much as reading, but that in terms of official time allowances "10 per cent of the school time on language activities is devoted to oral expression, 30 per cent to written expression, 8 per cent to understanding of oral expression, and 52 per cent to understanding of written languages."[2] To concomitantly measure this trait during the examination, at least from the student's point of view, would consciously or unconsciously give it more significance; consequently a more desirable attitude relative to its development may be established by students.

Lehman[3] presents objective data that appear contradictory to popular opinion. His study signifies that the results obtained by the listening method correlate with the reading method as much as the results from the latter method correlate with themselves. That is to say that the listening method produces virtually as consistent results as the reading method. Then again students have the conviction that they make many more errors by the listening method than by the reading method. Lehman's data, on this point, collide with popular prejudice. By a study of 27,969 answers on true-false statements he found that 25.15 per cent of the errors were made on the reading and 24.74 per cent by the listening method. These figures, of course, are too similar to have significance. From this study we might conclude that the listening method produces substantially the same results as the reading method.

In harmony with Lehman's findings, Jensen's study[4] reveals that virtually the same results are obtained by the listening method as by the reading method. There was a slight advantage of the reading method over the reading-listening method.

[2] *Ibid.*

[3] Lehman, Harvey C. "The Oral *versus* the Mimeographed True-False. School and Society 30: 470–472, October 5, 1929.

[4] Jensen, Milton B. "An Evaluation of Three Methods of Presenting True-False Examinations." School and Society 32: 675–677.

With these conclusions in mind, the expression of students' preference as to method of procedure is significant. Eighty-five (85) per cent preferred the reading method over the other two; thirty (30) per cent preferred the listening method to the reading-listening method; *no student preferred the listening method to the reading method of presentation.* Preferences were based largely on the opinion that they made larger scores by the reading method than by either of the other methods. A careful study of Jensen's data leads us to confirm the necessity of further investigation of this problem.

In this article the problem is attacked from a different point of view. In neither of the above mentioned studies were abilities, as measured by mental tests, taken into consideration. In this study, however, the index of "fairness" of each method is regarded in relation to the learning ability as measured by mental ability tests. In terms of the ideal, assuming that pupils are doing justice to themselves, those with good ability should make good scores, average ability average marks and those with poor ability poor marks, especially when objective examinations which minimize the personal element in grading are administered.

METHOD

The data for this study were obtained from five college classes. Three tests were given to a Principles of Education class and one test was given to each of the following classes: 21 students in Tests and Measurements (for High School teachers and principals), 49 students in Tests and Measurements (for Elementary School teachers—in two sections of 27 and 22 students respectively), 37 students in Educational Psychology.[5] A total of 7,363 reactions was secured from these five classes by each of the methods—the listening and

[5] The data from Principles of Education were obtained from a Keuka College group, while the remaining data were secured from classes in Concord College, Athens, West Virginia.

reading. Table III gives the number of True-False statements and the total number of reactions obtained from each class.

The statements were first presented by the listening method. By this procedure the students were asked to print a "T" or an "F," as the case might be, after the number corresponding to each statement which was read twice. These same statements were again given to the students in mimeographed form just one week later. This latter method is reported in this study as the reading method. The only material needed by the students during the listening procedure was a blank sheet of paper and pencil. In the reading method each pupil was furnished the statements so arranged that a "T" or an "F" could be printed before each statement number. The papers were scored by the right minus the wrong formula.

Following the administering of the listening and reading tests, reactions were obtained concerning student preferences of these procedures from the Principles of Education class. Opinions were obtained on the problem, *Which method of procedure do you prefer, the listening or the reading method?* Then the students were asked to give their reasons for favoring the procedure chosen. These results are presented later.

The intelligence quotients were secured by administering the Otis Self-Administering Test of Mental Ability, Form A.

All of the coefficients of correlation were worked out by the Pearson Product-Moment method.

RESULTS

Which method of procedure do students prefer?

In this study eighty-four (84) per cent preferred the reading method and only sixteen (16) per cent preferred the listening method. These data vary somewhat from Jensen's results. He found that not a single student preferred the listening method to the reading method of presentation. In view of the fact that listening ability scatters itself over the scale in virtually the same form of distribution as reading ability,

when a large number of cases are treated, the notions which students offered with respect to preferences are pertinent.

What reasons do students give to substantiate their preferences as to procedure?

Seventy-one (71) different reasons were given by those who preferred the reading method, while only ten were given by those favoring the listening method. When we consider the per cent of students who chose each method we find the number of reasons given by each group about proportional. That is to say since 84 per cent chose the reading and only 16 per cent the listening method we must naturally expect fewer reasons given in the latter event.

Tables I and II present each reason with the per cent of occurrence.

TABLE I

Reasons given by students for preferring the reading method with per cent of occurrence

	Per cent
Distribute the time; spend more time on difficult statements; can read statements as often as desired	41
Avoid misunderstanding from failure to hear all the words distinctly; interpretation easier because sight is keener than hearing; "eye-gate" better than "ear-gate"	24
Concentration is better because one does not have to listen	9
Forget the beginning of oral statements by the time the end of the sentence is reached	6
Less exciting; no hurry; don't need to listen intently	6
Emphasis in oral placed sometimes on wrong phrases	5
Get meaning of dictated statement very slowly	3
Mimeographed statements are more in the form in which we first get impressions from the text	1
Saves time; can be read once much quicker than dictated twice	1
Better opportunity to do one's best	1
Oral method gives impaired meaning	1
More accustomed to reading than listening	1
Can grasp main idea more easily	1

Some of these notions offer valuable suggestions for further experimentation. For example, the first reason given in favor

TABLE II

Reasons given by students for preferring the listening method with per cent of occurrence

	Per cent
Immediate reaction is an advantage because no time is given for doubt to arise; first impressions usually right ones	30
Can concentrate better with hearing statements	20
Decisions once made are held; no changes are made	20
Easier to understand oral statements because I read aloud	10
Minimizes the guessing factor	10
Easier to think clearly and accurately under pressure	10

of the listening method—"immediate reaction is an advantage because no time is given for doubt to rise." Is it true that "first impressions are usually right ones?"

What relationship is there between scores made by the listening procedure when correlated with the scores made by the reading method?

Do students rank about the same place on the scale with one method as with the other? Since students show a decided preference for the reading method, do the coefficients of correlation indicate a decided change in position, to the advantage of the student, by this method? Data which will help partially to answer these questions are imparted in Table III.

Since the average coefficient of correlation is "marked" we might conclude, that so far as these data are concerned, students' opinions greatly exaggerate the advantage of the reading method over the listening method in their ability to make higher marks.

When potential ability is considered, which method of procedure indicates a "fairer" ranking of the students?

Under ideal conditions we would expect those with high potential ability to make high scores, those with low to make low scores and those with average ability average scores. We never get this ideal condition but we can at least state which of these two methods produces the "fairer" ranking of stu-

TABLE III

Coefficients of correlation between scores made by the listening method and the reading method

SUBJECT	NO. OF STUDENTS	NO. OF T-F STATEMENTS	NO. OF REACTIONS	R
Tests and Measurements (for H. S. teachers)	21	35	735	0.37
Tests and Measurements (for ele. teachers)—				
Section 1	27	30	810	0.50
Section 2	22	30	660	0.55
Educational Psychology	37	35	1295	0.50
Principles of Education—				
Test 1	37	39	1443	0.54
Test 2	35	40	1440	0.49
Test 3	34	30	1020	0.70
Total	213	239	7363	0.51

lents when potential ability is measured by means of the intelligence quotient.

TABLE IV

Coefficient of correlation showing the relationship between scores made by the listening procedure and mental ability; also relationship between scores on reading method and mental ability

SUBJECT	NO. OF STUDENTS	LISTENING AND IQ	READING AND IQ
Tests and Measurements (H. S.)	21	0.60	–0.04
Tests and Measurements (Ele. teachers)—			
Section 1	27	0.35	0.46
Section 2	22	0.53	0.42
Educational Psychology	37	0.36	0.22
Principles of Education—			
Test 1	37	0.28	0.11
Test 2	35	0.22	0.26
Test 3	34	0.22	0.26
		Average.. 0.36	0.25

Table IV shows which scores correlate most closely with mental ability.

The scores by the listening method indicates a marked relationship with potential ability. The coefficients for the reading method and mental ability denote in most instances some relationship is present but that it is "low." Again the higher correlation signifies that the listening method tells the truer and "fairer" story of the achievement of the pupils.

CONCLUSIONS

Though a large per cent of students prefer the reading method they seem to do as well by the listening procedure.

The listening procedure seems to present a "fairer" estimate of the achievement of the students when their potential abilities are taken into consideration.

This study denotes that the extra time spent in mimeographing examination papers is not justified.

This study seems to open several avenues for further research on this problem.

THE RELATION OF SEVERAL FACTORS TO FACTUAL MEMORY

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INTRODUCTION

Object.

This is an investigation of the relation of chronological age, mental level, silent reading ability and vocabulary knowledge to the ability of junior and senior high school pupils to remember the facts contained in short articles which they were required to read a single time. It developed out of the author's study of "Factual Memory of Secondary School Pupils for a Short Article which They Read a Single Time."[1]

Related Studies.

The relation of chronological age to rote memory has been investigated rather thoroughly by the method of group averages. It seems to be generally accepted that age is a factor in the development of memory in the years before adolescence, but that the relation is uncertain and fluctuating after puberty. Some, indeed, find a decline in ability to remember after a period of maximal efficiency at about 14 years of age. It seems to the writer, however, that such observed decline is more apparent than real, being due to attitude rather than loss of ability, and that what occurs is simply a flattening out of the curve of improvement such as we generally find in growth curves.[2]

[1] *University of Pittsburgh Bulletin*, Vol. 27, No. 3. The Graduate School Abstracts, vol. VI, pp. 39–46. (1930.) See also Alfred G. Dietze and George E. Jones, same title, in current (November and December, 1931) issues of *Journal of Educational Psychology.*

[2] See especially B. Bourbon, "Influence de l'age sur la memoire immediate," in *Revue Philosophique*, vol. XXXVIII, pp. 148–167. (1894.)

Earlier experimenters disagree with respect to the influence of mental level upon memory. Thus Wissler finds no significant relation, while Jacobson finds a high degree of correspondence between the two factors. Since the more wide-spread use of correlational devices, however, a significant correspondence has been demonstrated, and Pyle says emphatically that "all psychologists who have seriously investigated the relation of memory to intelligence have found the facts as stated above," *viz.*,—that there is a marked correlation between the two abilities.[3]

A survey of the literature reveals no investigations of the relation of reading ability and vocabulary knowledge to memory.

SOURCE OF DATA

Subjects.

The subjects were the pupils used in the author's investigation of factual memory referred to at the beginning of this article. Only those pupils were used for whom scores were

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A. Pohlman, *Experimentelle Beitraege zur Lehre vom Gadaechtniss.* Berlin, 1906; and for a summary of studies: G. M. Whipple, *Manual of Mental and Physical Tests,* Part II—Complexer Processes. Warwick and York, Baltimore, 1915. Second Edition, pp. 150–221.

[3] The early investigations cited are: C. Wissler, "The Correlation of Mental and Physical Tests," in *Psychological Monographs,* vol. III, no. 6 (1901); and J. Jacobson, "Experiments on Prehension," in *Mind,* vol, XII, pp. 75–79. (1887.)

For correlation studies see: W. Brown, "Some Experimental Results in the Correlation of Mental Abilities," in *British Journal of Psychology,* vol. III, pp. 296–322. (1910); C. Burt, "Experimental Studies of General Intelligence," in *British Journal of Psychology,* vol. III, pp. 94–177, (1909); Ibid., "Experimental Tests of Higher Mental Processes," in *Journal of Educational Pedagogy,* vol. I, pp. 93–112, (1911); A. L. Lee, "An Experimental Study of Retention in Its Relation to Intelligence," in *Psychological Monographs,* vol. XXXIV, no. 4, (1925); B. R. Simpson, *Correlations of Mental Abilities,* Columbia University Contributions to Education, no. 53. (1912)

The quotation is from W. H. Pyle, *The Psychology of Learning.* Warwick and York, Baltimore, 1928. Revised Edition. pp. 173–174.

available in all of the traits needed for the present purposes. These numbered 983 children in grades VII to XII distributed in the following groups: I, 93 cases; II, 223 cases; III, 119 cases; IV, 241 cases; V, 115 cases; VI, 192 cases.

Memory Tests.

Memory tests were given for three 1000-word articles (Radium, Germans, and Arkwright) after intervals of immediate, 1 day, 14 days, 30 days and 100 days by means of highly objective multiple-choice tests. The tests contained from 100 to 125 questions respectively. Each of the groups took part in the immediate memory experiment and in two of the delayed memory experiments, using different articles for each experiment participated in as follows:

Group I, Immediate Radium, 1 day Germans, 100 days Arkwright;

Group II, Immediate Radium, 14 days Germans, 30 days Arkwright;

Group III, Immediate Germans, 1 day Arkwright, 100 days Radium;

Group IV, Immediate Germans, 14 days Arkwright, 30 days Radium;

Group V, Immediate Arkwright, 1 day Radium, 100 days Germans;

Group VI, Immediate Arkwright, 14 days Radium, 30 days Germans.

For more detailed description of the administration of the experiments, the difficulty of the articles, and the reliability and validity of the tests the reader should consult the article previously cited.

Chronological Age.

The age of the subjects was taken from the school records and recorded as of January 1, 1929.

Mental Level.

The IQ's of the subjects were obtained from the school records and converted into mental age scores as of January

1, 1929. The records were based on National, Otis and Terman group tests. Usually ratings were available for two or three tests, and the average ratings were recorded.

Silent Reading.

Monroe's Silent Reading Test III was given by the experimenter to all the subjects. The function of this test, as defined by Monroe, DeVoss and Kelley, is "to measure the ability of pupils to read simple paragraphs for the purpose of answering specific questions."[4] It is, therefore, an indirect measure of comprehension, this being the specific function in which the writer was interested. The rate scores of the test were not used.

Vocabulary Knowledge.

The vocabulary test was likewise given by the experimenter, Holley's Sentence Vocabulary Scale being used for the purpose. This test makes use of the Stanford-Binet vocabulary in multiple-choice form. It is highly objective and is considered to be a fair measure of intelligence.

CORRELATION RESULTS

The correlation results are shown in tables I–IV with their probable errors. The Pearson product moment method was used in obtaining these coefficients.

Table I gives the correlation coefficients for the various memory periods and chronological age. Since these correlations are very low, no partial correlations were computed for age.

Table II gives the simple correlations between memory and mental age (r_{12}), and the partial correlations with vocabulary knowledge held constant ($r_{12.3}$), with silent reading held constant ($r_{12.4}$), and with both factors held constant ($r_{12.34}$).

Table III gives the correlations between memory and vocabulary knowledge: r_{13}, $r_{13.2}$, $r_{13.4}$, and $r_{13.24}$.

[4] W. S. Monroe, J. C. DeVoss, and F. J. Kelley, *Educational Tests and Measurements.* Houghton Mifflin Co., Boston, 1924. p. 101.

Similarly Table IV gives the correlations between memory and silent reading: r_{14}, $r_{14.2}$, $r_{14.3}$, and $r_{14.23}$.

TABLE I
Correlation Coefficients for Factual Memory and Age

GROUP	IMMEDIATE MEMORY		1 DAY MEMORY		14 DAY MEMORY		30 DAY MEMORY		100 DAY MEMORY	
	r	P.E.	r	P.E.	r	P.E.	r	P.E.	r	P.E.
I	−.10	.069	−.07	.069	.....	.....	.....	.....	−.18	.067
II	.33	.041	.....	.....	.20	.044	.27	.042	.....	.....
III	.25	.058	.34	.055	.....	.....	.....	.....	−.01	.062
IV	.09	.043	.....	.....	−.24	.041	−.02	.044	.....	.....
V	.42	.051	.45	.050	.....	.....	.....	.....	.16	.060
VI	.21	.047	.....	.....	−.01	.049	−.01	.049	.....	.....
Ave.	.20		.24		−.02		.08		−.01	

DISCUSSION

Faculty Memory and Age

A study of Table I shows that the correlations between immediate memory and age within the population tested are positive, but very low; that the same holds true for memory after one day and age; and that the correlations for the longer periods are unstable and in general too low to be significant. There seems, therefore, to be a slight tendency for immediate and one day delayed memory scores to increase with age, and no relationship between memory after longer periods and chronological age. Since most of our cases are adolescents, our results are in agreement with the studies summarized above,—*viz.*, that there is negligible improvement in memory after puberty.

The uncertain relation between age and memory for what has been read stands out clearly in the averages of the age arrays. In Table V the age arrays for groups III and IV, and for groups V and VI have been combined. The averages fluctuate considerably. A comparison of ages 11 and 12 bears out the statement by Whipple, "The one safe generali-

TABLE II

*Correlation Coefficients for Factual Memory and M.A.**

GROUP	IMMEDIATE MEMORY		1 DAY MEMORY		14 DAY MEMORY		30 DAY MEMORY		100 DAY MEMORY	
	r	P.E.	r	P.E.	r	P.E.	r	P.E.	r	P.E.
r_{12}										
I	.48	.053	.51	.052	.....	.....	.....	.....	.24	.065
II	.66	.026	.....	.....	.58	.030	.50	.034	.....	.....
III	.53	.044	.51	.043	.....	.....	.....	.....	.32	.055
IV	.58	.029	.....	.....	.45	.035	.43	.036	.....	.....
V	.54	.044	.28	.057	.....	.....	.....	.....	.19	.060
VI	.53	.035	.....	.....	.50	.037	.41	.041	.....	.....
Ave.	.55		.43		.51		.45		.25	
$r_{12.3}$										
I	.30	.063	.25	.065	.....	.....	.....	.....	.10	.061
II	.25	.043	.....	.....	.19	.044	.17	.044	.....	.....
III	.17	.060	.15	.060	.....	.....	.....	.....	.28	.057
IV	.26	.041	.....	.....	.23	.041	.20	.042	.....	.....
V	.36	.054	.04	.064	.....	.....	.....	.....	.00	.064
VI	.22	.047	.....	.....	.21	.047	.12	.048	.....	.....
Ave.	.26		.15		.21		.16		.13	
$r_{12.4}$										
I	.37	.060	.37	.060	.....	.....	.....	.....	.17	.067
III	.38	.053	.38	.053	.....	.....	.....	.....	.24	.058
V	.41	.051	.18	.060	.....	.....	.....	.....	.02	.064
Ave.	.39		.31		.....		.....		.14	
$r_{12.34}$										
I	.25	.065	.19	.067	.....	.....	.....	.....	.08	.069
III	.13	.060	.12	.060	.....	.....	.....	.....	.25	.058
V	.31	.056	.02	.064	.....	.....	.....	.....	−.09	.062
Ave.	.23		.11		.....		.....		.09	

* 1 = memory, 2 = M.A., 3 = vocabulary, 4 = reading.

TABLE III

*Correlation Coefficients for Factual Memory and Vocabulary**

GROUP	IMMEDIATE MEMORY		1 DAY MEMORY		14 DAY MEMORY		30 DAY MEMORY		100 DAY MEMORY	
	r	P.E.	r	P.E.	r	P.E.	r	P.E.	r	P.E.
r_{12}										
I	.43	.056	.55	.048	.....	.....	.....	.....	.25	.065
II	.67	.025	.....	.....	.61	.029	.51	.034	.....	.....
III	.64	.036	.64	.036	.....	.....	.....	.....	.17	.060
IV	.62	.028	.....	.....	.43	.036	.43	.036	.....	.....
V	.49	.047	.44	.050	.....	.....	.....	.....	.32	.056
VI	.60	.031	.....	.....	.55	.034	.49	.037	.....	.....
Ave.	.58		.54		.55		.48		.25	
$r_{13.2}$										
I	.19	.067	.35	.060	.....	.....	.....	.....	.14	.068
II	.31	.041	.....	.....	.28	.042	.20	.044	.....	.....
III	.45	.050	.46	.049	.....	.....	.....	.....	.14	.068
IV	.37	.038	.....	.....	.17	.042	.21	.042	.....	.....
V	.24	.059	.35	.055	.....	.....	.....	.....	.27	.057
VI	.39	.042	.....	.....	.33	.043	.32	.044	.....	.....
Ave.	.33		.39		.26		.28		.12	
$r_{13.4}$										
I	.32	.062	.44	.056	.....	.....	.....	.....	.20	.066
III	.52	.045	.54	.044	.....	.....	.....	.....	.06	.061
V	.33	.056	.36	.054	.....	.....	.....	.....	.16	.060
Ave.	.39		.45		.....		.....		.14	
$r_{13.24}$										
I	.16	.068	.32	.043	.....	.....	.....	.....	.13	.068
III	.40	.052	.43	.050	.....	.....	.....	.....	−.09	.061
V	.17	.060	.31	.056	.....	.....	.....	.....	.17	.060
Ave.	.24		.35		.....	.....	.....		.07	

* 1 = memory, 2 = M.A., 3 = vocabulary, 4 = reading.

TABLE IV

Correlation Coefficients for Factual Memory and Reading

GROUP	IMMEDIATE MEMORY		1 DAY MEMORY		100 DAY MEMORY	
	r	P.E.	r	P.E.	r	P.E.
r_{14}						
I	.36	.060	−.07	.069	.18	.067
III	.47	.048	.42	.051	.23	.058
V	.48	.047	.28	.057	.40	.052
Ave.	.44		.38		.27	
$r_{14.2}$						
I	.15	.068	.24	.065	.07	.069
III	.27	.057	.22	.059	.08	.061
V	.32	.056	.18	.060	.36	.054
Ave.	.25		.21		.17	
$r_{14.3}$						
I	.20	.066	.25	.065	.07	.069
III	.19	.060	.12	.060	.16	.060
V	.32	.056	.09	.061	.29	.056
Ave.	.24		.15		18.	
$r_{14.23}$						
I	.12	.068	.18	.067	.05	.069
III	.15	.060	.09	.061	.10	.061
V	.26	.058	.08	.062	.30	.056
Ave.	.18		.12		.15	

* 1 = memory, 2 = M.A., 3 = vocabulary, 4 = reading.

zation as to dependence on age would appear to be that made at the outset,—*viz.*, capacity for immediate verbatim reproduction increases decidedly from early life to puberty, *particularly between 10 and 12*, and increases more slowly and *with fluctuations* from puberty to maturity.''[5] Apparently this is true of factual as well as for verbatim memory. Undoubtedly, however, if a more random sampling could be

[5] *Cf. op. cit.*, pp. 178–179, italics mine.

TABLE V

Average Immediate Memory by Age for Two Materials

AGE	11	12	13	14	15	16	17	18	19
Germans									
No. cases	10	20	31	77	73	73	43	23	8
Means	62.5	71.2	59.8	62.9	64.1	70.4	73.8	69.7	73.1
ARKWRIGHT									
No. cases	7	22	35	30	69	52	59	26	6
Means	44.2	53.7	54.5	49.8	52.7	59.6	62.9	63.1	62.5

tested the relationship would be closer. It is the writer's hypothesis that a test of a heterogeneous population of ages from six to twenty would give a curvilinear relationship showing memory to develop in accordance with the usual curve of growth.

Factual Memory and Mental Age

The zero order correlations between factual memory and mental age (Table II) are medium high, ranging from an average of .55 for immediate memory to an average of .25 for memory after 100 days, showing that mental age is positively correlated with factual memory. Holding vocabulary constant ($r_{12.3}$) reduces the correlations by about half in immediate memory and by more than half in delayed memory. These correlations show the net relationship when factors common to mental age and vocabulary knowledge have been eliminated. When reading ability is eliminated ($r_{12.4}$) the correlations are also considerably reduced, but silent reading ability as measured by the Monroe test does not influence the relationship between memory and mental age as much as does the elimination of vocabulary. The net relationship left when both factors are held constant ($r_{12.34}$) is not significantly different than that when only vocabulary is eliminated.

These results indicate that in general children of a higher mental level remember what they read better than children of a lower mental level; but that often children of poorer

mentality do as well as children of better mentality. The relationship is still decidedly present when vocabulary knowledge is kept constant, the latter factor bearing a considerable relation to both mental age and factual memory.

The average immediate memory scores of the groups reading Arkwright (V and VI) are as follows:

Mental Age	8–10	11	12	13	14	15	16	17	18	19	20
No.	3	14	35	55	67	56	43	16	8	5	5
Mean	42.3	36.9	45.2	53.4	54.1	59.6	65.5	65.9	66.9	70.5	71.5

The correlation in this combined group is .565. When the regression lines were drawn by connecting the means in the correlation table, there was some doubt as to the linearity of the regression. The correlation ratio was, accordingly, computed and turned out to be .616. Application of Blakeman's test for linearity proved the regression to be sufficiently linear for all practical purposes. These figures again show that memory and mental age are decidedly correlated.

Factual Memory and Vocabulary

The correlations between factual memory and vocabulary knowledge (Table III) (r_{13})are similar to those for memory and mental age. Holding either mental age constant ($r_{13.2}$) or reading score constant ($r_{13.4}$) reduces the correlations to about one half of the zero order coefficients, showing that these traits contribute significantly to the gross relation between memory and vocabulary. According to these results, the pupils who have the better vocabularies are able to remember better than pupils with poor vocabularies, and that this relation still remains to a considerable extent when mental age is kept constant, or when both mental age and reading ability are kept constant ($r_{13.24}$).

Factual Memory and Silent Reading

The correlation results for memory and silent reading ability (r_{14}, Table IV) indicate a low medium relationship. The

abilities measured by Monroe's reading test, therefore, are not as important conditions of memory as the other factors studied. This is supported by the fact that holding either vocabulary or mental age constant ($r_{14.3}$ and $r_{14.2}$) effects a considerable reduction in the size of the coefficients, and holding both constant ($r_{14.23}$) reduces the correlations to a negligible figure. Thus the correlation found between memory and silent reading ability is due to a very large extent to mental age and extent of vocabulary. However, to some extent children who make the higher comprehension scores in the reading test also remember better what they read. Since reading is made up of a large number of factors, the correlations between the various elements should be determined.

Multiple Correlations

The coefficients of multiple correlation $R_{(1.234)}$ for groups I, III, and V are as follows:

Immediate memory	Group I, .489;	Group III, .661;	Group V, .651
1 day memory	Group I, .609;	Group III, .649;	Group V, .441
100 day memory	Group I, .277;	Group III, .335;	Group V, .431

It should be noticed that these coefficients are not much different from r_{12}, or r_{13} for these groups, which again shows the small rôle played by reading ability in the gross relation between memory and mental age, or between memory and vocabulary knowledge.

CONCLUSIONS

1. Memory for the facts of an article read a single time improves very little with age during the years after adolescence and within the population of the junior and senior high school.

2. Memory for the factual content of an article read a single time is positively correlated with mental age to an extent shown by an average *r* of .53 for immediate memory, .43 for memory after 1 day, .51 for memory after 14 days, .45 for memory after 30 days, and .25 for memory after 100 days.

3. The correlation between memory and mental age is reduced to about half when vocabulary is held constant, and by about one-fourth when reading ability is held constant. Part of the correlation is, therefore, due to factors that are common to factual memory and these other variables.

4. Memory for the factual content of articles read a single time is positively correlated with extent of vocabulary to about the same degree as mental age.

5. Factual memory for an article read a single time has a low positive correlation to reading ability as measured by the comprehension score of Monroe's Silent Reading Test. The correlations range from .44 in immediate memory to .27 in delayed memory.

6. The correlations between factual memory and reading ability are reduced to negligible quantities by keeping mental age and vocabulary knowledge constant.

7. From the above it would follow that special attention to vocabulary and reading in the secondary schools would enable pupils to apprehend and remember more of what they read than they do under the present conditions.

A STUDY OF TESTS FOR APPRECIATION OF MUSIC

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The first experiment in devising a test for appreciation of music has already been described,[1] and the present study offers two important changes in the procedure and several minor improvements. These tests are founded on the assumption that the creation of an artist whose work has been generally acclaimed for its merit is more beautiful than the same creation altered by a deliberate attempt to spoil its various beautiful qualities. On the basis of such an assumption tests have already been developed in the field of pictorial art,[2] and of poetry,[3] and the preliminary study has shown that in spite of the increased difficulty encountered in presenting the musical test material to the subjects, it is nevertheless possible to employ this same technique and to develop a standardized objective test for appreciation of the beautiful in music which will attain a satisfactory degree of both reliability and usefulness.

The test items are piano compositions (including as wide a variety as possible in length, genre, style and period) and variations of these compositions made by mutilating them in certain definite ways. Each original with its mutilations is presented in one group, and the listener records his preference for one of the versions on a prepared schedule blank. The directions to the listener are to the effect that he will hear some

[1] Hevner, Kate, "Tests for Aesthetic Appreciation in the Field of Music," JOURNAL OF APPLIED PSYCH., Oct., 1930.

[2] Meier, Norman C., and Seashore, C. E., "Art Judgment Test," Bur. of Educ. Res., Univ. of Iowa, Iowa City, Iowa.

[3] Abbott, Allan and Trabue, M. R., "A Measure of Ability to Judge Poetry," Teachers College, Columbia University, New York City.

piano compositions in groups of four short pieces which are very much alike, and that he is to listen carefully and decide which of the four sounds most pleasing, most beautiful, most musical to him. One of the spoiled versions for the test was made by simplifying the music, omitting many of the tones, so that the music sounds bare, hollow, and uninteresting. A second version, called the elaborated, was made by introducing additional tones into the chords, and by adding passing tones and ornaments, so that the music was overdone, "frilly," and confusing. In a third version, the phrasing or melodic progression was changed, so that the music seemed formless or unbalanced. In every case, the original work was followed as closely as possible so that the change should be in one direction only.

These tests in the field of music involve one difficulty which is not encountered in similar tests for poetry and art talent. The subject cannot take his own time about examining the music nor can he come back to it a second time, in case he has momentarily ceased to listen to the test material. Chance errors due to the fluctuation of attention are therefore very great, and some help in listening must be given to the subject so that his preferences will be based as often as possible on music that he has actually perceived and comprehended. In other words, it is important to make his anticipation of what he is to hear fit as accurately as possible his actual sensations. Thus, in order to give the subjects a definite set for listening to a phrase from the cadenza of a Piano Concerto of Schumann, (Opus 41, C major), the experimenter announces: "This is a short theme from a piano concerto, that is, music written for the piano to be accompanied by an orchestra. It is rather stately and formal. Six measures in $\frac{4}{4}$ time." A similar statement appropriate to the music is made for each item in the test, warning the subject that the music is simple and melodic, or difficult and intricate, that it is slow and solemn or lively with a characteristic rhythm. Information of this

sort is more useful to the subject both for his attention and for his interpretation of the music than the assigning of titles following the suggestion of the composer. "Cradle Song," "By the Fireside," "Skylark" are likely to be misleading when only a few measures are selected from a long composition.

The 4-version form of the test (Form A3) contains twenty-four items and the total time required for giving it is fifty minutes. Because of the great difficulty reported by the subjects of keeping in mind the four different versions and in suspending their judgments until all four versions had been heard, it was decided to devise a simpler form of the test in which there would be a comparison of only two versions, the correct, and one mutilation. The test in this form (Form B1), since it is adapted to a smaller attention span, will be especially useful with younger children. The total time for giving this test is also fifty minutes but the number of items is increased from twenty-four to forty-eight, with sixteen of each kind of mutilation. The complete list of musical items for both Form A and Form B may be found in the Appendix to this article and the musical scores for the tests may be had by application to the author.

The various forms of this test have been given to a number of different groups, to music classes in the high school, to classes in Experimental Psychology, to University classes in harmony and in Public School music, and to a College Honorary Music Club. Most of these subjects are drawn from the upper social and economic classes in a city where opportunities for music are unusually good and, therefore, they represent a fairly homogeneous group. Nevertheless, the means for these groups are progressively higher, in the expected direction. Of the many subjects who have taken the various forms of the test, 313 took Form A3. Since this is the largest number of subjects who have taken any one form their results will be quoted, although very similar records have been obtained from the other forms.

TABLE I.

Means and Sigmas for 4 groups who took Form A3 (4-version test)

GROUP	NO. OF CASES	MEAN	SIGMA
High School Students	123	7.46	2.68
Students in Psych. Laboratory	76	9.5	3.96
Music Students	88	14.08	3.11
Honorary Music Club	25	15.3	2.5

Form A3 was played in every case by the same pianist but not on the same day, nor the same piano, nor under unvaryingly uniform conditions. Sometimes the cooperation was good and the conditions favorable, but often the rooms were crowded, the audience restless, and the piano poor.

The estimated reliability of Form A3, as calculated by the Odd-Even correlation and the Spearman Brown Formula ranges from .70 to .72 on groups of from 152 to 313. In the smaller groups composed of Psychology students only, with a much more restricted range, it goes down to .58. On Form B1 (the 2-version form) with a similar group, it is .70. With a group of 74 subjects who took both Form A3 and Form B1 about two months apart, the correlation between the two forms was .50.

Another, and possibly a more significant measure of the consistency of the test may be calculated by scoring the papers for constant preferences on the part of the subjects. The tendency to prefer elaborate, ornamental music can be measured in the 4-version form by adding together the number of times the subject marks the elaborate version "Best," and the simplified version "Worst," and in the 2-version form by summing the errors made by the subject in choosing the elaborate version, and subtracting from this sum his errors in choosing the simplified version. The coefficient of correlation between these two scores for 80 subjects who took both forms of the test is .59 and likewise for constant tendencies to prefer simplified music the coefficient is .58.

The subjects who take the test are always asked to classify themselves on two self-rating scales, one for musical training, based on such factors as the number of years of private lessons in music, high school and college credits in music courses, number of musical instruments in the home, etc., and one for musical talent, in which they use a five point scale for estimations of their ability to sing or play or read music, for their attendance at concerts, etc. The correlations between the test scores and musical training for 123 High School pupils is .45; for 74 Psychology students, it is .55 with Form A3, and .45 for Form B1. For the 88 students in the advanced music classes on Form A3 it is very low, .03. The High School pupils did not rate themselves on musical talent, but the correlations for the psychology students are .47 with Form A3 and .50 for Form B1. For the advanced music students, the correlation with Form A3 is .08.

A further analysis of the test results was made by comparing them with the percentile ranks on the Seashore measures of musical talent, and with intelligence as measured by the percentile ranks on the Minnesota College Ability Test. These results in terms of coefficients of correlation for 74 subjects who took Form A3 and Form B1 are as follows:

	FORM A3 (4-VERSION)	FORM B_1 (2-VERSION)
Minnesota C. A. T.	−.17	−.15
Consonance	.38	.31
Pitch	.21	.22
Rhythm	.20	.31
Time	.32	.20
Intensity	.25	.15
Tonal Memory	.54	.40
Sum of Seashore Percentiles	.50	.42

It is of interest to notice in these results that there is apparently no overlapping in the field of test intelligence although there is a good deal of overlapping with the musical talent as measured by the Seashore tests. It seems logical to

find the greatest amount of overlapping with the test for tonal memory and to find it present to a higher degree in Form A when the subject listens to 4 versions than in Form B when he listens to only 2 versions.

These results together with the measures of reliability quoted above, and the studies with talent and training, indicate that this test instrument can be of great use in measuring the listeners' ability to discriminate between good and bad music. Undoubtedly, the mechanics of giving the test will be improved when the test is recorded on rolls for the automatic piano. A more elaborate schedule for the recording of the results will prevent many of the artificially high scores due to the borrowing of information from one subject to another.

A further attempt to improve the conditions under which the subjects took the test was made by giving them certain information about the test in order to make it easier for them to listen and to attend. In the Meier-Seashore Art Judgment Test, which uses this same technique, the essential difference between the two pictures is clearly indicated for the subject on the test schedule. For its advantage in time saving alone, apart from other considerations, this information is a vital part of the procedure in the field of pictorial art, but in the music test which does not involve this factor of time saving to inform the listeners of the specific differences in the music may be of doubtful value, because the very perception of the differences from one version to another, which means that the music is heard as a combination of several different parts, is an important factor in enjoyment and appreciation. It is the unmusical subject who complains, "they all sound alike to me," and one intelligent but unmusical subject reported, "When I can perceive a difference, it is easy for me to indicate my preferences." An empirical test, therefore, seemed to be the only possible method for evaluating this variation in the procedure.

To the 98 subjects who constituted the control group, Form B2, a two-version edition, of the test was presented with the

instructions exactly as described above. To the 112 subjects in the experimental group the same music was played but the experimenter announced at the beginning of each item what the difference between the two versions would be. For example, in the Schumann "By the Fireside" the experimenter said, "The difference between the two versions is in the melody or tune," and in the Bach "menuetto," "the second is harmonized more fully and elaborately than the first." In some cases the subjects were told that the two pieces were alike except for the last measure or that the change was in the accompaniment in the bass.

The two groups of subjects were found to be approximately equal in intelligence and in musical talent and training; that is, there were no significant differences between their distributions on the Minnesota College ability test nor on the talent and training scales. It was expected that the experimental group with the more elaborate directions would make somewhat higher scores on the tests, but there is no significant difference between the means for the two groups. For the control group M is 28.9 and σ is 4.1 and for the experimental group M is 29.3 and σ is 4.7. This failure to benefit by the more elaborate instructions may be due to the fact that the less musical subjects were confused rather than helped by the added directions. A subject who might have had some success in judging on the basis of a general impression of the whole composition may have been somewhat disturbed when told to listen for a difference in the bass melody. The reported comments of the listeners, however, are in general more favorable when the announcements of the experimenter include the more detailed information.

SUMMARY

1. Tests for appreciation of music in which the subject records a preference for one of four similar versions of the same musical composition have proved difficult for the listeners because of the necessity of keeping all the four items in mind while making the judgments. Therefore an alternate

form of the test has been devised, designed especially for children and for adults with limited training in music, in which the subject listens to only two versions of each composition.

2. Results on this 2-version form show a very close correspondence with results from the 4-version form, in reliability, validity, and relationship to other mental and musical traits.

3. Experimental variation of the directions and instructions to the subjects has shown that quite specific information designed to facilitate the listener's apprehension of the music increases the listener's satisfaction with his own performance and in general insures a more favorable attitude on the part of the subjects toward these tests.

APPENDIX I—THE 24 ITEMS IN FORM A3

1. Ornstein, Op. 9, No. 5, "Evening Prayer," from "Pygmy Suite."
2. Rachmaninoff, Prelude, from 24 preludes for piano.
3. Beethoven, Symphony E maj. Op. 55.
4. Bach, Mass in B minor.
5. Schubert Sonata, Op. 120.
6. Handel, from the Messiah, "He shall Feed His Flock."
7. Bach, Chorale, "Rejoice Greatly, O My Soul."
8. Mozart, Minuet from Symphony in D.
9. Chopin, Prelude B min. Op. 28, No. 6.
10. Godard, Au Matin, Op. 80.
11. Gounod, "Funeral March of a Marionette."
12. Bohn, Song, "Still as the Night."
13. Grieg, Sonata, G minor, slow movement.
14. Wagner, Overture to Rienzi.
15. Schumann, Romanze in A minor.
16. Rachmaninoff, Prelude, X, Op. 23 (Largo).
17. Chopin, Sonata B min. Op. 35.
18. Gossec, Gavotte.
19. Schumann, Fantasie C maj. Op. 17.
20. MacDowell, from Woodland Sketches, "Uncle Remus."
21. Beethoven, From "Six Variations on an Original Theme," Op. 34.
22. Massenet, "Meditation from Thais."
23. Chopin, Prelude, Op. 28, No. 20.
24. Wagner, "Prize Song" from Meistersinger.

APPENDIX II—THE 48 ITEMS IN B2

Bach

Fifteen three part inventions, No. 3.

Chorale, "Gott sei und gnädig."
From Choralsange, Band I, No. 36.
Menuetto, from Band IX, B♭ Partita (Bauer).
Menuetto, from Band IX, Partita I.
Organ Prelude in G, Siloti arrangement.

Beethoven
Sonata, Op. 10, N. 3, Minuet.
" Op. 31, No. 3, Minuetto.
" Op. 13, Rondo.
" Op. 27, No. 1, Adagio.
" Op. 49, No. 2, Minuetto.
" Op. 49, No. 2, Minuetto.

Brahms
Sonato in F minor, Trio from Scherzo.
Sonato for violin and piano, C major, Allegro.
Ballade, Op. 10, No. 1.
Sonata in F minor, Adagio.

Bruch, from Oratorio, "Arminius."
Chopin, Prelude, Op. 28, No. 6.
" Op. 28, No. 17.
Mazurka, Op. 7, No. 2.
Debussy, Reverie, F major.
Gounod, Prelude from "Faust."
Griffes, "The White Peacock."
Haydn, From "The Creation." Andante, B major.
Jensen, Op. 33, No. 5, "Elfin Dance."
Kuhlau, Sonatina, Op. 20, No. 2, Adagio.
MacDowell, "Woodland Sketches," Op. 51, No. 3.
Mendelssohn, Oratorio "St. Paul," Aria, "O God Have Mercy."
Oratorio "St. Paul," Chorale, "O Thou the True Light."
"Folk Song" from "Songs without Words."
Mozart, from Opera "Die Entführing."
Song, "The Violet."
Sonata in D, Andante.
Ornstein, "Pygmy Suite," Op. 9, No. 4. Op. 9, No. 3.
Purcell, Courante, G major.
Rachmaninoff, Romance in A.
Rameau, from Pièces de Clavécin, "Les Niais de Sologne."
Ravel, Sonatine in F minor, first movement.
Schubert, Op. Postb., Trio from Scherzo in B♭.
Schumann, Kinderscenen, Op. 15, Nos. 1, 6, 8, 11, 12.
Concerto, C major, Cadenza.
R. Strauss, "Morgen."
Tschaikowsky, "Skylark."

PSYCHOLOGICAL TESTING IN PSYCHOPATHOLOGY

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In testing adults we meet problems we are not apt to meet in testing children, but they are problems which must be solved if psychological testing is to increase in value and if it is to compete in exactness with other laboratory tests such as blood tests and neurological examinations.

In order to refine our measures so as to approach this goal we need not only adult norms but also some fundamental theories of intelligence as a basis of our choice of tests. The problem of intelligence needs, beside the statistical approach which it has so abundantly had, both a clinical and a logical approach. From the clinical aspect, it seems to me we can now, after the necessary preliminary work of the last thirty years, learn more in individual work from clues offered by studying the exceptions to our correlations than by increasing the number of tests merely because of high correlations with chosen criteria. From the logical aspect, abstract intelligence—the ability to see relations, to make generalizations, to draw inferences, etc., that ability which differentiates dull persons from those who can grasp and solve the most abstruse problems—is probably the ability of greatest importance in human understanding if for no other reasons than because it furnishes so many times more data for the understanding of new situations than is furnished by immediate sensory experience and because it transforms a mediocre memory span into one many times larger, since the person who can generalize can with one memory impression retain tens or hundreds of details merely because they fit into some generalization which he is capable of making; while the person who cannot generalize is limited in his background of interpretative data, to the number of discrete and often meaningless impressions he receives.

Among the facts which show our need of adult norms—of some definite idea as to how adults would differ on many tests from children—and of our need of a more definite basis for our choice of tests, we may note:

First, that tests which correlate well cannot be interchanged at random. When they are, the result is that different opinions are given by different examiners according to which tests were mostly used. Second, that when the same tests are used and the same results are obtained, testers disagree in their interpretations of these results—disagreements which would be less frequent and less emphatic if there were some agreement as to what the essential ability is which we are trying to measure and some idea as to what the other tests probably show. Again, some scales when standardized on persons of one chronological age have different results when used with persons of other ages. One short performance scale used on a group over thirty years of age showed results which averaged more than a year lower than the scores of the same subjects on the Terman Scale. Another performance scale—the short Army Performance Scale which is of great value in clinical work—averaged more than a year higher with subjects from twelve to fifteen years of age, a difference which was not pure chance but which occurred in more than three-fourths of the cases. It averaged about a year higher for those sixteen and seventeen years old; three-fourths of a year higher for those from eighteen to twenty-nine; two or three months higher for ages from thirty to thirty-four; while after about forty (the cases were too few to get the exact time of change) the averages began to be lower than the Terman ratings even though certain tests of the Terman Scale are also affected by differences in age. Such results indicate the necessity of knowing more about what the different tests measure before we can accept them as valid measures of intelligence because of their correlations with the results of other tests on persons of different ages. The subjects studied surely were not suddenly more intelligent when confronted by the one test nor less intelligent when confronted by the other.

Which scales are valid measures of intelligence and which parts of the scales are questions which should be determined as well as how much deviation is to be expected from persons of different ages.

Again, subjects of inferior level as measured by the Terman Scale tend to score relatively higher on the performance scales thus indicating that maturity, as well as intelligence, probably partly affects the scores.

Finally, persons who cannot function normally (psychotic persons whose responses are interfered with by secondary factors due to organic deterioration or to emotional interference) tend to fail tests which require concentration and the impression of new data such as paragraph memory and drawing designs from memory, while they pass at relatively high levels intelligence tests which require the reproduction of old learning, thus producing the pathological scattering in the results with which we are familiar, and which is distinct from the benign scattering often found in the results of persons of inferior intellectual level who are functioning unusually well and who score relatively high on just those tests which psychotic persons tend to fail. This phenomenon furnishes us with a working plan in psychopathology; for, since we cannot get a valid measure of the intelligence of such subjects by using all the tests of a regular scale, the normal intelligence of such subjects is best measured by tests which tend to change least when there is organic or emotional interference. Now the test which tends to remain the same for a long time after mental deterioration begins, and for as long as any test would be of any practical use, is the vocabulary test which correlates highly with school and professional ability; while the tests which are more changeable under different conditions are tests which separately correlate less well with scholastic ability and evidently measure something more changeable and less important but necessary for the functioning of the other ability. Because of this difference in the reliability of different tests under different circumstances we often have two subjects who make equivalent gross scores, yet inspection of the results will show that the one is of inferior intellectual

level but functioning unusually well as shown by his ability to concentrate and to fixate new data as well as by promptness of response in the recall of any old learning; while the other, who makes the same gross score, is recognized as of higher intelligence but of inferior mental control as shown by his inability to concentrate and to fixate new data and in extreme cases by marked retardation in the recall of any old learning, secondary factors having interfered to prevent his making a normal score. The reason for this seems to be that the person of inferior intelligence who functions unusually well and whose scores on tests which emphasize the fixation phase of memory and the time of response are near or above the average scores of persons of his intellectual level, is thinking promptly and efficiently about anything within his range of understanding; while the mal-functioning person who is of higher intellectual level makes the same score merely because some of the tests are so easy for him that he can respond almost automatically and without any clear apprehension of the general situation—*though he cannot score as high as do normal persons of his intellectual level!*

The value of taking the abstract level as the basis of comparison and measuring the efficiency phase separately has been put to the proof in cases of organic deterioration, paretic subjects being chosen for the study. The score considered was the difference between the abstract level as measured by the vocabulary, and the score on a group of tests which emphasized memory and the time of response. The scoring of the latter tests was determined by giving them to two hundred sixty-four normal persons—normal in this case meaning non-psychotic and non-deteriorated—and the results were kept in separate groups according to the vocabulary rating thus furnishing a norm for each mental level. The result with the normal group was a close clustering of scores about the norm, the interquartile range of scores extending from 0.8 of a year below the norm to 0.8 of a year above, and only two scores were as much as three years below. In each of these cases there was professional or vocational mal-adjustment.

The paretic subjects were not in the extreme degrees of

mental deterioration but were a group which had recently been committed to the hospital and were in sufficiently good physical condition to have malarial treatment. Fifty-six per cent of them were later paroled. Their results not only showed a statistically reliable difference from those of the normal group but they also showed an obviously great difference. Those in the worse condition and never paroled averaged more than five years below the norms for persons of their estimated intellectual level with an interquartile range of difference extending from more than six and a half years below to four years below—a range entirely below any normal scores.

The group which was later paroled averaged a year higher than the group which was never paroled and four years below the norms for persons of their intellectual level. This difference between the two paretic groups was a reliable difference and showed that the examination had prognostic value as an indication of future "parole ability" beside incidentally proving that there is a high and positive correlation between future parole and degree of deterioration before any treatment begins.

The fact was proven that *gross scores have entirely different meanings according to their relation to the estimated intellectual level*—whether higher or lower and how much higher or lower. For example, two persons might make equivalent scores and the one be paroled and the other not; or one person might make a score of eight and be paroled while one who made a score of eleven might be held in the hospital and later be reported as worse, or as in a stationary condition with a poor prognosis—the reason being that the one who scored eight was mentally inferior when in his normal condition and was scoring only a few years below the average for persons of his intellectual level; while the one who scored eleven was of average or superior level normally and was scoring five or more years below his norm.

The entire research showed the importance of separating

the two phases of intelligence and indicated that in order to have any valid opinion as to a subject's mental efficiency both scores are necessary; that is, the rating of normal intelligence and one of present efficiency, the difference between the two scores being, as has been emphasized before, more important than either score alone or any combination rating.

In fact the distinction is so important that in any practical work as well as in psychopathology we should have with the mental age three figures or statements which give a better idea of what it means:

One indicating the condition of the sensory functions—whether normal or showing special abilities or disabilities, a phase which will always be of especial importance in work with children and in vocational advice.

Second, the scholastic level as measured by such tests as analogies, antonyms-synonyms, generalizations, inferences, fine distinctions between the meanings of words, and the vocabulary. The vocabulary will probably be the only kind of test valid in psychotic conditions, since it requires old learning and responses are not timed, but it possibly can be improved for adults by definitely choosing different types of words which shall be standardized for the different levels.

Third, the efficiency level as measured by a group of tests to be especially planned which will either emphasize the impression of new data or time responses requiring old learning. Each of the tests will probably correlate so well with intellectual level that any deviation of the average score from the norm will be of significance as to normal or pathological functioning according to the degree of deviation.

In fact the time is ripe for psychologists to furnish another quantitative measure for the analysis and understanding of mental ability, and the measure which I am suggesting (the difference between the intellectual level and the efficiency level) will be of inestimable value in all phases of practical work and especially in those border-line psychotic conditions which show no marked pathological signs.

THE DEATH SENTENCE AND PSYCHOLOGICAL EXAMINATIONS

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University of Georgia

It will be of interest in the history of psychology to outline briefly two cases in which the death sentenceswere averteed through the investigation and report of a psychologist. So far as the writer knows these two cases are without precedent. The psychologist as psychologist has no standing in the courts of the State of Georgia. The report of the present writer was acted upon by the Prison Commission of Georgia and upon their recommendation the Governor changed the death sentences of two murderers to life imprisonment.

Two brothers, aged 18 years and two months, and 16 years eight months, respectively, were convicted of the murder of a negro and his wife and were sentenced to capital punishment. They were to die in the electric chair the last of October, 1930. Early in October a reprieve of thirty days was granted and the attorneys for the defense requested the present writer to make a psychological examination and report what could be presented to the Prison Commission. No fees were offered, accepted or expected. The defense attorneys had been appointed by the court and had done all their work at their own personal expense; the defendants and their family had no means to use in the defense.

The investigation of the cases included the following: personal examination by the writer of each boy, Wayman and Harvey Bradberry, in the psychological laboratory of the University of Georgia, especially with the Stanford-Binet examination; study of school records involving interviews with teachers; study of court records relating to the family; signed statements of physicians and from a superintendent of an

institution for the insane; personal consultations with officers and private individuals who had been acquainted with the family and especially with the two brothers; personal interviews with the father and the mother.

Some of the results are as follows: Both boys tested on the Stanford-Binet examination showed a mental age a little below 10. Because of the danger of malingering all possible checks were made; all evidence pointed to the fact that the above result was probably substantially correct, especially school records, interviews with teachers, and one court record which stated that these boys were below normal, their ancestors were below normal and one grandmother was hardly accountable "for any acting or doing." One sister of the mother and two sisters of the father were insane; one was a case of epilepsy; a second, manic-depressive, the third, form of insanity not stated. Two are now in institutions for the insane; the other died in an institution for the insane. The medical history showed venereal disease, incest and other immoral sexual relations in the family. Personal and social conditions included violence of father, call upon the sheriff by the mother for protection for self and children from the father; the boys led to drink bootleg whiskey by the father at the ages of about 12 or 13; one or both boys actively engaged in helping the father deliver bootleg whiskey; five blind tigers in the vicinity of the home. There are nine children and according to statements made to the writer, only one of them was thought to be of normal or above normal intelligence. The immediate influence in connection with the crimes included lawless companions and especially one brother-in-law who is now serving a life sentence in connection with this case; and the fact that the murdered negro was known to be in the habit of carrying a large amount of money in his pocket.

The summary and conclusion are given below verbatim:

"The conditions of life of Wayman and Harvey Bradberry from childhood on were those which present knowledge indi-

cates as conducive to delinquency and crime. They may be summarized as follows:

Defective mentality
Relationship to and companionship with insane and feeble-minded individuals
Violence in the home
Lack of or defective home training and discipline
Immoral relationships within the home
Immoral and lawless relations with individuals outside the home
Influence of whiskey, bootlegging and blind tigers and of a community which supported them
Corrupt influence of father, companions, and especially of one brother-in-law
Lack of wholesome occupations and refining influence in the home and probably insufficient of either in the community
Specific temptation and probably strong influence of an older and criminally minded individual.

It is the judgment of the present writer that the causes of the crimes committed lie in the conditions stated and summarized above and that the boys, Wayman and Harvey Bradberry, did not have fair chances of developing into law-abiding citizens."

The order commuting the death sentences to life imprisonment for these two individuals was signed by the Governor on October 27, 1930.

REPORT OF THE 7TH INTERNATIONAL CONFERENCE ON PSYCHOTECHNIQUE

HARRY DEXTER KITSON
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The Seventh International Conference on Psychotechnique (Industrial Psychology) was held in Moscow, Russia, September 6 to 13, 1931. Approximately 500 delegates were present, about 400 from Russia and 100 from 15 other countries, chiefly psychologists and engineers who are using psychological techniques in industry.

The program was arranged in three divisions, dealing respectively with Theory of Psychotechnique, Mathematical Treatment of Psychotechnical Data and Professiography, which we may translate as the study of occupations. Sixty-five papers were scheduled; some, however, were only printed, no personal appearance being made by the writers. Two Americans appeared on the program, the writer and Dr. Douglas Fryer. A paper by Dr. W. V. Bingham was printed.

As might be expected, the paper dealing with the first-mentioned theme contributed no ideas in advance of those promulgated by Münsterberg in 1913. A few reports of experimental work were placed in this division but dealt with general psychological phenomena such as emotion, reaction time, attention and the like, and bore little relation to industrial life. Indeed, it was evident that a number of the delegates were actuated not so much by an interest in industrial psychology as by a desire to see Russia in its present stage of development.

The sessions on Statistical Methods showed only an elementary acquaintance with statistics on the part of European psychologists. A blind application of r seems to constitute the stock in trade of the European psychotechnicians. The

general attitude may be expressed in the words of one psychotechnician who remarked that that is all of the statistics a psychotechnician needs to know anyway.

The studies of occupations which were reported in the sessions on "Professiography" consisted, in large part, of the application of tests to the problem of prognosticating vocational proficiency, though there were a half-dozen papers on industrial accidents.

In addition to the three official languages of the Congress—French, German, and English—papers were also presented in Russian. Translators were stationed in a pit underneath the stage and each translator spoke into a microphone which was connected with sockets in each seat in the auditorium. The listener had a pair of ear-phones and, by inserting the plug into the appropriate socket he could hear the speech in his own language.

An elaborate series of sight-seeing trips had been arranged by Intourist, the government travel-agency. These included visits to factories, schools, prisons, orphanages, museums, theatres, and so forth. Perfect freedom was given the delegates to go anywhere and talk to anyone.

A visit to the Personnel Department of the Moscow Street Railway showed a system of selecting employees that is not paralleled in many American cities. Elaborate tests are given —among them, the American Army Beta, since the majority of the applicants are illiterate.

Regarding the state of industrial psychology in Russia, one receives the impression that there is a lively appreciation of the value of psychological methods in industry. So intent are the people on establishing an industrial state that they are ready to employ every means that promises to speed up production. The workers in factories appear anxious to cooperate with the psychologists and all seem bent on accomplishing the aims of the five-year-plan, which is kept before the people's minds by flaring posters and every other conceivable form of propaganda.

Naturally the number of well-trained psychologists is small at present, compared with the number of industrial establishments being erected, but they are very much in earnest and are striving hard to develop themselves under the direction of Comrade Spielrein of the Communistic university of Moscow.

An interesting index of the way in which communistic doctrines permeate even scientific endeavor may be found in the scientific literature of the Russians. Instead of referring to Wundt and other recognized scientists, they refer for their authority to the writings of Marx and Lenin.

The most illuminating demonstration of the degree to which science is influenced by communistic doctrine was furnished by the opening address of the chairman of the soviet committee of the congress, who took pains to point out that only in a communistic society can a psychologist properly attack industrial problems; that the psychologists who reside in the so-called capitalistic countries are handicapped by the necessity of catering to capitalistic interests. Several of the visiting psychologists, in succeeding sessions, took occasion to point out that a true scientist works objectively and searches for facts without regard to their political consequences; that the psychologists in the so-called capitalistic countries are not the slaves of capitalism and are free to search for truth. But their protests apparently availed little, for our ears continued to be assailed by the epithet "bourgeois psychologists."

As was natural, the conference was being used by the Soviet government as a means of enlightening the young Russian psychotechnicians regarding the procedures and researches carried on in other countries. At the close of each formal session, an aftermath was held for the benefit of the Russians, when the reports given on the main program were summarized and sifted for applications which might be especially appropriate to the local situation. It is probable, also, that these after-meetings were intended to purge the minds of the young communists from any contaminating "capitalistic" ideas that might have seeped through.

Naturally, the most important outcome of a visit to Russia is the opportunity to witness the attempt to form a society on a communistic basis. Every visitor is bound to draw his own conclusions, but these would be out of place in this report. It is, however, permissible to express one's appreciation of the efforts exerted by the soviet committee and by the Russian psychologists to the end that the visitors might enjoy their stay despite the difficult conditions prevailing in the country. The delegates were the guests of the government, were entertained at the government-owned hotels, were furnished guides, and were given *carte blanche,* in so far as such a thing exists in Russia.

According to present plans, the next conference will be held in Vienna in 1933, and the following one in New York in 1935.

NOTES AND NEWS

A recent survey made by the Federal Office of Education of fifty of the largest Land-Grant Colleges and Universities of the United States reveals a wide range in the ages of entering students. As would be expected a majority of students (51 per cent) entered college at the age of 18 or 19 years; 12 per cent entered at 20 years of age; 7 per cent at 21 years. That a considerable number of older persons attend college is indicated by the large proportion over 21 years of age, which totaled 11 per cent of the 22,159 students. Of these older students many were school teachers who desired to improve their training and to keep up with modern changes in school practices and methods. One per cent started at 15 or earlier and 4 per cent started to college at 16 years.

E. H. Cressy, Secretary of the Committee for Christian Colleges in China, in a recent address related some of the facts concerning the development of educational work in China. Mr. Cressy himself has worked among the Chinese for some 20 years. Ten million children, men and women in China are now attending schools of all grades from primary to and through the university. Before 1910 comparatively few Chinese women and girls attended school and as late as 1915 only one government high school for girls had been established although there were a number of normal schools of high school grade open to girls.

Psychology is being applied to the attempted solution of the unemployment problem in Minnesota, where a large-scale survey of the whole situation is being made under the direction of Dean Russell A. Stevenson, of the school of business administration at the state university. Four thousand out-of-work men and women are being given mental tests and other examinations in an effort to determine whether or not they have been trying to hold jobs for which they were unfitted. The tests aim to discover each individual's physical and mental aptitudes, vocational interests, trade skill proficiency, and personality traits. It is planned to test a control group of an equal number of persons who are steadily employed, in order to find out if possible what personal, educational, and economic factors differ in the two groups. Findings are to be published in bulletin form at intervals over a period of two years. These may be secured by addressing the University of Minnesota Press, Minneapolis, Minn.

On September 1, 1931, the California Bureau of Juvenile Research, which formerly had headquarters at the Whittier State School, moved to Los Angeles (674 West 36th Street) near the campus of the University of Southern California. This change of headquarters is in accordance with the program of the California State Department of Institutions, which has increased the scope of the work of the Bureau to include clinical work in all institutions of the state in which there are children. This means that, in addition to having charge of the clinical work at the Whittier State School, the Bureau will be available for consultant service to the California School for Girls at Ventura, Pacific Colony at Spadra, and the Preston School of Industry at Ione. The location near the University of Southern California will make possible the expansion of the program of research work carried on by graduate students. The Bureau has been given a large increase in its appropriation for the coming biennium with which to carry on this expanded program.

Aviation is being taught both day and night in the Burgard Vocational High School, Buffalo, New York. The courses extend over a four-year period. Students spend one half of every day in the aviation work shops; the other half is spent in studying regular school subjects including related trade work in science, mathematics and drafting. Shop and laboratory work includes construction and repair of aircraft, aircraft engines, aircraft machine shop work, aircraft electrical repair and welding, aerodynamics, meteorology and air navigation. Buffalo is an outstanding aviation center and this fact has stimulated interest in Burgard's aviation courses.

Teaching more than 3,800 boys and girls to play band and orchestra instruments by radio has been accomplished by the Michigan Department of Public Instruction and the University of Michigan over Station WJR. At the request of school superintendents in rural communities who could not afford to engage a band teacher, 3,800 free lesson booklets were distributed to adults and children in radio-equipped schools. The booklets gave written instructions to be followed while broadcasts were taking place. The usual teachers were in charge during the lesson periods. A studio band from the University of Michigan, using one instrument of each type taught, played and sang each song several times at each broadcast, holding the tones long enough to permit listeners-in to match the tone on their instruments. Before long both the studio band and the pupils were playing together.

Teachers and school administrators who wish to keep abreast of progressive innovations and vital trends in education in the United States and foreign countries would find it expedient to avail themselves of *School Life,* the monthly journal of the Federal bureau. More than one hundred specialists are constantly on the lookout for the new and helpful in the various fields of education. *School Life* may be obtained for one year for fifty cents from the Superintendent of Documents, Government Printing Office, Washington, D. C.

BOOK REVIEWS

BRUCE V. MOORE AND GEORGE W. HARTMANN. *Readings in Industrial Psychology.* D. Appleton & Co. Pp. xxxix and 560. $5.00.

Two hundred twenty-seven contributions on the application of Psychology to Industrial Management are included in this volume under the chapter headings of Basic Principles, Popular versus Scientific Procedures in Appraising Men, Technique of Personnel Selection, Rating Scales, Mental Tests and Individual Placement, Analysis of Occupational Interests, Vocational Guidance, Training the Worker, Efficiency and Scientific Management, Fatigue and Rest Pauses, The Working Environment, Accidents, Monotony, Morale, Labor Unrest and Strikes, Leadership and Social Adjustment, Distributing the Product. The book opens with an introduction by R. I. Rees, of the A. T. & T. Co., and 17 pages of biography, indicating the interests and achievements of the selected authors in the field of Industrial Psychology.

One of the chief tasks of the compiler of any source book is to supply the matrix into which the selections are set and to give the whole a certain degree of unity. The compilers feel they have accomplished this successfully since they have "experimented with the location of each excerpt, and written connecting passages which also serve to fill in any gaps in the system of ideas." Five criteria were applied to each possible selection before the chosen one was included, viz., basic conceptual contribution, reliability of the writer, conciseness of style, adjustment to student level, and inaccessibility.

Aside from lack of unity the usual criticism against source books is scrappiness. This the compilers have very well avoided. Only twelve of the selections are less than one page in length, and many of them are from three to five pages, with an occasional one much longer.

An appraisal of their choices from available literature on the subject can best be made by selecting one or two of the fields and evaluating their choices. For that purpose I have selected two chapters, one on Procedures in Appraising Men and the other on Vocational Guidance. The first contains sixteen selections and is typical of their longer chapters, the other contains five. In the first section well chosen descriptions and criticisms are given of physiognomy, stereotypes, graphology, phrenology, palmistry and mind-reading. Articles from Hollingworth, Jastrow, Sheldon, Rice, Cleeton and Dunlap are among the classics in literature. Carefully compiled statistical data lend support to most of the criticisms. The one mistake in the chapter is the selection and

location of the article from Westerberg. The article is a poor illustration of works on physiognomy and is placed in the chapter after the system has been well criticised. Two-thirds of it could well be accepted and the natural inference on the part of the student is that the author approves of the content of the choice whereas the opposite was the intention. If it were placed second instead of in the third position in the section, the logical development would show more consistency.

The chapter on Vocational Guidance is limited to two aspects, one on the nature of the problem and the other on Predicting Careers. We congratulate the compilers for the selections they have included. Three of the sanest articles in the field by Freyer, Moore and C. Burt make the section well worth while. The disappointing feature is the limitation of the chapter. One would expect selections on such divisions of the problem as basic principles in choosing a vocation, tests for vocational guidance, and the case method of vocational guidance. Hepner's chapter on Choosing a Vocation in his *Psychology in Modern Business* has much to offer by way of supplementing the Readings.

One could wish that compilers of source books would supplement their sections by selected bibliographies. Their careful reading of the entire field with the elimination necessary before choices are made surely gives an opportunity for the selection of references which might be of great value to any who wish to follow the subject further.

Despite these minor defects Hartmann and Moore have given a collection of well selected articles which deserve wide distribution.

HERBERT MOORE,
Mt. Holyoke College.

A. A. ROBACK. *Personality.* Sci-Art Publishers, Cambridge, Mass. 1931.

"This essay is not intended as a text book or treatise, but merely as a summary of the work and description of methods that have been employed recently in the study of personality," says the author. Beginning with Wyclif's use of personality in 1380 the author touches upon the evolution of the concept of "personality" as found in literature, in theology, in philosophy, in its lately vulgarized conception as in Eleanor Glyn's "it;" ending the evolution of the concept with the psychological. In this both objective and subjective approaches are indicated. The author's definition of personality is as follows: "an integrative combination of all our cognitive, effective, conative, and even physical qualities." Personality is a more inclusive term than character. The author differentiates between temperament and character. The former he conceives of as the sum total of or blend of one's affective qualities as they impress others; the latter he conceives of as a part of personality which

coincides with volitional and inhibitory phases of behavior. To use the author's own words "character is the residue of personality after the cognitive, affective, and physical qualities have been removed."

Passing from Jung's dichotomy of *introversion* and *extraversion* to the Spranger and the Adlerian concepts of "patterns of life" the reader is led on to Kretschmer's four-fold division of personality types, namely, (1) cerebral, (2) muscular, (3) respiratory, (4) digestive. Saudet's, followed by Klage's conception of graphology as a method of studying personality, is then mentioned. Three schools, the behavioristic, the psychoanalytic, and the "constitutional" come cursorily under discussion with regard to their views on personality.

Part I ends with a series of partial portraits of famous musicians who illustrate what the author calls "personal idioms." Men like Mendelssohn, Wagner, Beethoven, Chopin, etc., portray certain ways of doing things which the author characterizes as "personal idioms."

Part II deals with the topic "Can personality be changed?" The author takes the position that "while it is true, in a sense, that personalities are born, it cannot be denied that there is a possibility of modification and improvement. . . ." *Insight* and *will* to change are necessary before change occurs. Always, however, the author claims, "the inner personality must be modified before outward appearances assume a different aspect."

It is an interesting little book full of literary figures and allusions even if at times a bit lacking in scientific cogency. The essay ends with lines which Shakespeare put into Cassius' mouth, as follows:

The fault, dear Brutus, is not in our stars
But in ourselves that we are underlings.

These lines may or may not be comforting to some of us.

JAMES R. PATRICK,
Ohio University.

GLENN DEVERE HIGGINSON. ***Fields of Psychology. A study of man and his environment.*** Henry Holt & Co., New York. 1931. xviii + 613 pp.

There are two ways in which the elementary course in psychology may be viewed: first, as an introduction to specific fundamentals of the science; second, as a survey of the whole field of psychological interest. The second of these is taken in this text, and the treatment excels that of any of the few books having a similar point of view. The clear and easy style emphasizes scientific accuracy and rigidly avoids any semblance to a "popular" work. Its organization is so radically different from the ordinary textbook that it is necessary to outline the contents.

Part I consists of three chapters, the first on the origin and nature of science, and the two succeeding on psychological systems. In these two chapters there is a brief but intelligible exposition of five systems: structuralism, functionalism, behaviorism, *Gestalt*, and the psychology of the psycho-physical organism. This discussion is of great value because it clearly differentiates between these schools of thought without confusing the reader.

Part II considers developmental psychology, both phylogenetic and ontogenetic. The discussion is introduced by a chapter on evolution and heredity, followed by a résumé of animal psychology. Ontogenesis is introduced by a chapter on the development of the human race which is unique in psychological texts. Infancy and childhood are treated in all aspects of motor phenomena, memory, emotions, thinking and language. The section is concluded by a chapter on the psychology of groups.

Part III treats in a very able manner the application of psychology to education, industry, advertising, selling, criminology and law. This last section deserves special mention because in a brief way it illustrates the psychological reactions of the judge, jury, lawyer and witness. Expanded and elaborated to a full book it would be a valuable contribution to an important, if neglected, field.

Part IV deals with the problems of abnormal psychology. The nature, causes and significance of mental diseases, disturbances of psychological functions, the psychoneuroses, the psychoses, and psychotherapy are clearly discussed, and much case material is quoted.

This summary suggests the wide field covered, and, when it is considered that there has been an equitable distribution of space and no subject is slighted, one wonders if the book is not too huge. The author, however, says, "Only those materials have been included which could be covered during the course of one semester." This reviewer is not so sanguine!

In any work of this sort a few errors are sure to creep in. Figure 35 on page 316 is certainly not an illustration of a performance test and that it is not meant to be is shown by the discussion of the preceding paragraph. The author says that Woodworth's race studies at St. Louis were the earliest studies of real worth; of course they do not compare with those of the Cambridge Expedition under Rivers made some five or six years earlier.

However, a few minor errors of this sort do not detract from the usefulness of the whole book. It is this reviewer's opinion that courses based on this text would have great popularity.

C. M. Louttit,
Indiana University.

NORMA V. SCHEIDEMANN. *The Psychology of Exceptional Children.* Houghton Mifflin Co., Boston. 1931. Pp. xvii and 520. $3.25.

Dr. Scheidemann has drawn together a considerable body of the experimental literature upon exceptional children, reviewed it well, criticised it fairly, and synthesized it into a readable whole. The point of view throughout the book is experimental. Without doubt no two individuals would choose exactly the same experiments to report or give the same emphasis to the various types discussed. However, anyone can find a great deal of appropriately selected material and hence the book will have value even to those well acquainted with the field. Naturally the text cannot be comprehensive on any particular type of case for the literature in some fields is very voluminous.

To the reviewer, it seems that speech defectives and left-handed children receive the most adequate attention, while the feebleminded, considering the seriousness of the problem, receive rather scanty treatment. Other types discussed are the gifted, the specially talented, the psychoneurotic, the psychopathic, the deaf and blind, the congenitally word blind and the delinquent. The following types are treated briefly in a short chapter: epileptics, hysterics, backward, undernourished, and overweight children. A brief preliminary review of the possible origins of trait differences prefaces the study of the children. In this chapter the reviewer was surprised to find so much space devoted to Neo-Lamarckianism and especially surprising was the quotation, without comment, of the work of the now discredited Kammerer. However, the more strictly psychological, experimental work was more carefully reviewed.

Those acquainted with the field may occasionally be disappointed by the brevity of the discussion of some pet topic. However, the book has much to commend it as a text—its designated purpose. Its readability is attested by the fact that students will occasionally continue to read long after they have finished their assigned work. Altogether the reviewer is inclined to think it the best book in its field, and that Dr. Scheidemann has done the educational and psychological world a distinct service.

STUART M. STOKE,
Mt. Holyoke College.

NEW BOOKS AND PAMPHLETS RECEIVED*

All books and pamphlets for review should be sent to James P. Porter, Department of Psychology, Ohio University, Athens, Ohio.

An Annotated Bibliography on the Methodology of Scientific Research as Applied to Education. A. S. Barr and Mabel Rudisill. University of Wisconsin, Bulletin of the Bureau of Educational Research, No. 13, June 1, 1931. University of Wisconsin, Madison, Wisconsin. 129 pp.

The Art of Learning. Walter B. Pitkin. McGraw-Hill Company, New York City, 1931. $2.50. 409 pp.

Consciousness and Its Purpose. Aura May Hollen. The Keats Publications, Hollywood, California, 1931. 246 pp.

Englisch-Deutsch fur Psychologen. James A. Hamilton. Gaul and Bantelmann, Frankfurt, 1931. 103 pp.

The Integration of Teaching: A Work-Book for Teachers from the Kindergarten to the Senior College. Samuel Quigley. Edwards Brothers, Inc., Ann Arbor, Michigan, 1931. $2.00. 198 pp.

Introvert or Extrovert? Dow Thompson. Harlow Publishing Company, Oklahoma City, Oklahoma, 1931. 117 pp.

Measurement of Ability in Children. B. C. Wallis. Oxford University Press, 114 Fifth Avenue, New York City, 1931. 50 cents. 36 pp.

The Minnesota Unemployment Research Project. Russell A. Stevenson. University of Minnesota Press, Minneapolis, Minnesota, 1931. 26 pp.

The Nervous System. James Dunlop Lickley. Longmans, Green & Company, New York City, 1931. $3.50. 144 pp.

Readings in Industrial Psychology. Bruce V. Moore and George W. Hartmann. D. Appleton & Company, New York City, 1931. $5.00. 560 pp.

The Reliability of Quarterly Marks in the Seventh Grade of Junior High School, Together with the Value of Certain Standard Tests in Predicting Them. J. Carey Taylor. Johns Hopkins Press, Baltimore, Md., 1931. 54 pp.

The Reliability and Validity of Tests. L. L. Thurstone. Edwards Brothers, Inc., Ann Arbor, Michigan, 1931. 113 pp.

Research Bulletin No. 4, Institute of Child Welfare. University of California, Berkeley, California. 6 pp.

The School and Mental Health. Clara Bassett. 40 cents. 66 pp.

* Mention here does not preclude further comment.

The Scientific Basis of Social Work. MAURICE J. KARPF. Columbia University Press, New York City, 1931. $3.75. 424 pp.

Students' Guide to Efficient Study. LUELLA COLE PRESSEY AND JESSIE MARY FERGUSON. Richard H. Smith, New York City, 1931. 39 pp.

Survey of Collegiate Instruction in Marketing and Advertising—1929–30. ALFRED T. FALK, Director. Bureau of Research and Education, Advertising Federation of America, 420 Lexington Avenue, New York City. $2.50. 62 pp.

INDEX OF SUBJECTS

Titles of books are followed by the name of the author of the work reviewed. All other references are to original articles.

Abilities, relationship, character trait ratings, and mental, 378.
Ability tests, study of motor, 109.
Adult level testing, determining point of emphasis, college-, 462.
Advertisements, magazines, new method, determining the relative efficiencies, 390.
Affection, aesthetics of rectangles and theories, 310.
Affective values, colored lights, preliminary study, 294.
Animal drive and the learning process (Holt), 426.
Animal motivation studies: the Albino rat (Warden), 534.
Appreciation, music, study of tests for, 575.
Art judgment test, notes on Meier-Seashore, 418.
Art of study, the (Pear), 533.
Attitudes, study of customer, 252.
Aviation, who knows about, 39.

Background, typographical factors, speed of reading, variations in color of print and, 471.
Behaviorism (Watson), 329.
Behavior sample, traits, children, concerning magnitude of, 480.
Binet mental ages, comparison hollow square scores with Stanford, 79.
Birth, intelligence and month, 149.

Certainty of judgments, interval, number judged, study, reliability of judgments, 259.
Character trait ratings, mental abilities, relationship, 378; —, traits, correlation, direct suggestibility, certain, 1.
Child psychology (Curti), 234.
Children, concerning magnitude, behavior sample, traits, 480; —, language difficulty, Spanish-American, 92; —, rhythm and consonance, comparison, white and negro, 53.
Children who run on all fours (Hrdlicka), 425.
Classroom scaler and grader (Russell), 533.
Clerical operators, motion study tables, 82.
College-adult level testing, determining point of emphasis, 462; —, level, repeaters, 411; —, personality training, changing emphasis, Liberal Arts, 96; —, students, effectiveness, various rates of silent reading, 214.
Color of print and background, typographical factors, speed of reading, variations in, 471.
Colored lights, study, affective values of, 294.
Conference, Psychotechnique 7th International, 593.
Consonance, comparison, white and negro children, rhythm and, 53.
Containers, consumer preferences, small glass, 346.
Coordination, study, warming-up, more complicated perceptual-motor, 499.
Customer, attitude, study, 252.

Design, prognostic test for students in, 335.
Differences, handwriting, sex, 486.
Difficulty, Spanish-American, language, 92.

Education, typical points of view on learning presented beginning students of, 155.
Educational achievement in relation to intelligence (St. John), 103.
Efficiencies, advertisements, magazines, new method determining relative, 390.
Emotionality, the prisoner, general, 436.
Emotions, psychopathic personalities, Pressey X–O tests, 182.
Examination, listening versus reading method, true-false, 555.
Examinations, death sentence, psychological, 590.
Experimental psychology (Lindworsky), 328.
Experimental social psychology (Murphy and Murphy), 529.

Factors, alternative explanation, specific, 358; ——, factual memory, relations of, 563; ——, speed of reading, color of print and background, typographical, 471; ——, theory of two, alternative explanation, general factor "G," 16.
Factual memory, relations, several factors, 563.
False examination, listening versus reading method, true, 555.
Feeling, general curves and conditions, 126.
Fields of psychology (Higginson), 602.
First course, psychology, students' reactions, 512.
Form board, comparison, hollow square scores, Stanford Binet mental ages, reliability of Lincoln hollow square, 79.

"G," theory, two factors, alternative explanation, general factor, 16.
General factor "G," theory, two factors, alternative explanation, 16.
General psychology for professional students (Gilliland, Morgan and Stevens), 105.
Generalization, effect of intelligence upon phonetic, 168.
Genetic studies of genius: the promise of youth (Burks, Jensen and Terman), 331.
Glass containers, consumer preferences, small, 346.
Group experiments in elementary psychology (Ford), 429.
Growth, criticism, mental, 319.

Handwriting, sex differences, 486.
Hawaiians, test performance, selected group, part-, 43.
High school teachers, aptitude test, 208.
Hollerith cards, punching psychological and sociological data, 199.
Hollow square form board, comparison of hollow square scores, Stanford Binet mental ages, reliability, 79.
Human learning (Thorndike), 231.

Intelligence, phonetic generalization, effect of, 168.
Interval between judgments, number judged, study, reliability of

judgments, relation to certainty, 259.

Judgment test, notes on Meier-Seashore art, 418.
Judgments, certainty, interval, number judged, reliability of, 259.

Knowledge, psychology, before and after first course, extent, nature of students', 279.

Learning, beginning students, education, typical points of view, 155.
Legibility, black, white print, relative, 248.
Level, repeaters, college, 411; —— testing, determining point of emphasis, college-adult, 462.
Liberal arts college, personality training, changing emphasis, 96.
Lights, study, affective values of colored, 294.
Line length, studies of typographical factors influencing speed of reading, simultaneous variation, type size and, 72.

Magazines, new method, determining relative efficiencies, advertisements, 390.
Magnitude, sample, behavior traits, children, concerning, 480.
Maladjustments, necessity, psychometric tests in study of, 304.
Meier-Seashore art judgment test, notes, 418.
Memory, relations, several factors of factual, 563.
Mental abilities, relationship, character trait ratings and, 378.
Mental ages, comparison of hollow square scores with Stanford Binet, 79.
Method, determining relative efficiencies of advertisements, magazines, new, 390; ——, true-false examinations, listening versus reading, 555.
Methods of correlation analysis (Ezekiel), 103.
Metre-sense, poetry, study of, 539.
Month of birth, intelligence and, 149.
Motor ability tests, study, 109; ——, coordination, study, warming up, more complicated perceptual-, 499.
Music, rhythm tests, poetry and, 90; ——, study of tests, appreciation, 575.

Nature, students' knowledge, psychology before, after, first course, extent and, 279.
Negro children, rhythm and consonance, comparison, white and, 53.

Operators, motion study tables, clerical, 82.
Order of birth, parent-age, and intelligence (Thurstone and Jenkins), 530.

Perceptual-motor coordination, study, warming-up, 499.
Performance, selected group, part-Hawaiians, 43.
Personalities, Pressey X–O tests, study of emotions, psychopathic, 182.
Personality (Roback), 601.
Phonetic generalization, effect, intelligence upon, 168.

Poetry and music, rhythm tests, 90; —, study of metre-sense, 539.
Preferences, small glass containers, consumer, 346.
Pressey X–O test, Downey Will-Temperament test, inverse trends, 273; —, study of the emotions, psychopathic personalities, 182.
Print and background, typographical factors, speed of reading, variations in color of, 471; —, relative legibility, black, white, 248.
Prisoner, general emotionality, 436.
Psychological examinations, death sentence and, 590; —, sociological data, Hollerith cards, punching, 199.
Psychology for advertisers (Lucas and Benson), 104.
Psychology of exceptional children, the (Scheidemann), 604.
Psychology before, after, first course, extent, nature, students' knowledge of, 279: —, measurements in, 545; —, students' reactions to first course, 512.
Psychometric tests, maladjustments, necessity of, 304.
Psychopathic personalities, Pressey X–O tests, study of emotions in, 182.
Psychopathology, psychological testing in, 584.
Psychotechnique, 7th International Conference, 593.

Race psychology, a study of racial mental differences (Garth), 232.
Rates, silent reading of college students, effectiveness of various, 214.
Ratings, mental abilities, relationship, character trait, 378.
Reactions, first course, psychology, students', 512.
Reading, black type, white type, studies, typographical factors, speed, 241; —, college students, effectiveness, various rates of silent, 214; —, color of print and background, typographical factors, speed of, 471; —, method, true-false examinations, listening versus, 555; —, simultaneous variation, type size and line length, studies of typographical factors, speed of, 72; —, tests, validity, silent, 35.
Rectangles, theories of affection, aesthetics of, 310.
Reliability, judgments, to certainty, to interval, number judged, 259.
Rhythm and consonance, comparison, white and negro children, 53; —, tests in poetry and music, 90.

School teachers, aptitude test, high, 208.
Science der charactère, la, (Boven), 531.
Seashore art judgment test, notes on Meier-, 418.
Sense in poetry, study of metre-, 539.
Sentence, psychological examinations, death, 590.
Seventh International Conference, psychotechnique, 593.
Silent reading, college students, effectiveness, various rates, 214; —— reading tests, validity, 35.
Sleep: why we need it and how to get it (Laird and Miller), 424.

Social psychology (Folsom), 233.
Sociological data, Hollerith cards, punching psychological, 199.
Spanish-American children, language difficulty, 92.
Specific factors, alternative explanation, 358.
Speed, reading, black type, white type, study of typographical factors, 241; —, of reading, color of print and background, typographical factors, 471; of reading, simultaneous variation, type size, line length, studies, typographical factors, 72.
Stanford Binet mental ages, comparison hollow square scores, 79.
Students' attitude (Katz and Allport), 327; — knowledge, psychology before, after, first course, extent and nature, 279.
Students in design, prognostic test, 335; —, effectiveness, various rates of silent reading of college, 214; —, of education, typical points of view on learning presented to beginning, 155.
Study, affective values, colored lights, preliminary, 294; —, maladjustments, necessity, psychometric tests, 304; —, tables, clerical operators, motion, 82.
Subjects judged, study of reliability, judgments, relation to certainty, to interval, to number of, 259.
Suggestibility, diurnal variations, 431; —, with certain character traits, correlation, direct, 1.

Tables, clerical operators, motion study, 82.
Teachers, aptitude test, high school, 208.
Temperament test, inverse trends in Pressey X–O and Downey Will-, 273.
Test, Downey Will-Temperament, inverse trends in Pressey X–O, 273; —, for high school teachers, aptitude, 208; —, notes on Meier-Seashore art judgment, 418; —, students in design, prognostic, 335.
Testing, determining point of emphasis, college-adult level, 462; —, psychopatholoy, psychological, 584.
Tests, appreciation of music, study of 575; —, in poetry and music, rhythm, 90; —, study, emotions, psychopathic personalities, Pressey X–O, 182; —, study, maladjustments, necessity, psychometric, 304; —, study of motor ability, 109; —, validity, silent reading, 35.
Theories of affection, aesthetics of rectangles, 310.
Training, changing emphasis in Liberal Arts college, personality, 96.
Trait ratings, mental abilities, relationship, character, 378.
Traits, children, concerning magnitude, behavior sample, 480; —, correlation, direct suggestibility, character, 1.
Treatment of behavior disorders following encephalitis (Bond and Appel), 330.
Trends, Pressey X–O test, Downey Will-Temperament test, inverse, 273.
True-false examinations, listening versus reading method in, 555.
Type size, line length, studies, typographical factors influenc-

ing speed of reading, simultaneous variation, 72; ——, studies, typographical factors, speed of reading, black, white, 241.

Typographical factors, speed of reading, black type, white type, studies, 241; ——, factors, speed of reading, color of print and background, 471; ——, factors influencing speed of reading, simultaneous variation, type size, line length, studies, 72.

Values, colored lights, study of affective, 294.

Variations, suggestibility, diurnal, 431.

Warming-up, complicated perceptual-motor coordination, study, 499.

White and negro children, rhythm and consonance, comparison, 53.

Will-Temperament test, inverse trends, Pressey X–O test, Downey, 273.

INDEX OF AUTHORS

The names of authors of original contributions are printed in CAPITALS AND SMALL CAPITALS.

ADAMS, HENRY F., 16, 358, 545.
BABCOCK, HARRIET, 584.
BAILOR, E. M., 279.
BALL, ROBERT J., 436.
BARKLEY, KEY LEE, 390.
BAUMGARTNER, MAXINE, 1.
Book, W. F., 232.
BROOM, M. EUSTACE, 35.
BROSE, JOHN L., 39.
BROTEMARKLE, ROBERT A., 462.
Burtt, Harold E., 533.
CARROLL, HERBERT A., 168.
CASON, HULSEY, 126.
CASTLEMAN, NANCY, 208.
CEDERSTROM, J. A., 411.
CRANE, HARRY W., 304.
DIETZ, ALFRED G., 563.
DOUGLAS, JOSEPHINE, 35.
DOWNEY, JUNE E., 273.
Edgerton, Harold A., 104.
EDWARDS, A. S., 590.
ESTABROOKS, G. H., 96.
FARNSWORTH, PAUL B., 418.
GARRISON, K. C., 378.
Garvey, C. R., 425.
Gentry, J. R., 429, 534.
GREENE, EDWARD B., 214.
GRIFFITTS, C. H., 109.
GROVER, MARGARET, 208.
GUILFORD, J. P., 335.
GUILFORD, RUTH B., 335.
HAMMOND, MARION, 90.
HAUGHT, B. F., 92.
HEVNER, KATE, 575.
HOLLINGWORTH, H. L., 431.
HOLMES, GRACE, 248.
HOVDE, HOWARD T., 346.
HOWELL, SUE CRAFT, 378.
HOWELLS, THOMAS H., 539.
JOHNSON, ALLEAN A., 539.
KITSON, HARRY D., 593.
LEAHY, ALICE M., 199.
LINCOLN, EDWARD A., 79.
LOUTTIT, C. M., 43, 105, 106, 234, 330, 426, 531, 603.
MELTZER, H., 279.
MISUMI, ISSEI, 418.
MOORE, HERBERT, 208.
MORRISON, BEULAH M., 294.
OLSON, ELMA, 182.
PATERSON, DONALD G., 72, 241, 471.
Patrick, James R., 237, 429, 536, 602.
PINTNER, RUDOLF, 149, 533.
REMMERS, H. H., 155.
ROGERS, HERBERT W., 82.
RUDD, MARION, 35.
SEWARD, GEORGENE H., 512.
SKAGGS, ERNEST B., 499.
SMITH, G. R., 319.
SMITH, MAPHEUS, 480.
Stoke, Stuart M., 332, 604.
STREEP, ROSALIND L., 53.
STUMPF, N. F., 555.
TINKER, MILES A., 72, 241, 471.
TURNEY, AUSTIN H., 259.
WALLACE, VERNA KIMBERLEY, 39.
WALTON, WILLIAM E., 294.
WATERS, R. H., 252.
WEBER, C. O., 310.
YOUNG, PAUL THOMAS, 486.

Directory of American Psychological Periodicals

(Continued)

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(Continued on Third Cover)